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PICKS and SHOVELS

By O. E. POTTER

Silence Is British

Rat-a-tat-tat! Rat-a-tat-tat! For days we worked to this accompaniment, shouted ourselves hoarse in an effort to converse above the din, and vainly tried to carry on telephone conversations in spite of it, until our throats were sore, our nerves frazzled and our dispositions, such as they are, completely ruined. And all because the WPA elected to remove the street car tracks in front of our building.

On one of the most hectic days, our eye fell upon a small item in *The Canadian Engineer*, entitled "Silent Road Breakers." How our heart warmed to the idea! In fact, we've felt for a long time that something of the sort should be done, but somehow we just never got around to it.

Anyway the gist of the item is that in Westminster, England, road drills built on the principle of being seen and not heard are to be put to work on a pavement breaking contract. Experiments were carried out with four different kinds of drills equipped with silencers. The time for a given job varied considerably, the quietest drill taking the longest time. However, one was selected, the one in fact which did the job in the shortest time but which also has marked noise-resistant properties.

All Westminster paving contracts this season will be carried out by contractors using silencers.

Oh, to be in England, now that silence's there!

New Roads Under the Sun

In order that Benito Africanus, as Il Duce has been referred to, and his cohorts may travel with ease in the "little

(Continued on page 37)

Winter Maintenance Stressed by Engineer

C. J. Swift, Highway Engr. of Blue Earth County, Minn., Finds Taxpayers Demand Prompt Snow Removal

(Photo on page 48)

THE old adage "An ounce of prevention is worth a pound of cure" is the guiding motto of the Blue Earth County, Minn., Department of Roads, says Clair J. Swift, Highway Engineer. This county was one of the first of the southern Minnesota counties to provide winter maintenance and is many years beyond the argument as to whether winter maintenance is necessary or whether it pays.

"Winter maintenance is, we feel," said Mr. Swift, "just as necessary, if not more so, than summer maintenance, and it is the job of the Engineering Department to be ever on the look-out for more efficiency. The tax-payers of this county not only expect snow removal but want it on time."

Blue Earth County is located in south central Minnesota and, although not subject to as much snowfall as some of the points farther north, is more or less open country subject to severe winds. Most of the land is under cultivation

(Continued on page 19)

New Deal for Main St. Sixty-Foot Pavement Given Hot-Mix Surface

(Photos on page 48)

HOT-mix hauled 24 miles and laid hot, spread on sections of 34, 48, 54 and 60-foot street with a 30-foot asphalt screed and finishing machine, using hand spreading and raking at the sides, and the use of the first of a new type of roller in the East, featured the NRM contract of B. F. Patterson, Columbus, Ohio, contractor, in Delaware, Ohio.

The section, 2 miles long, was through the business district of the town and included the removal of old street car track and the switches and filling the trenches with brick set in cement grout. Then the entire width of street was resurfaced to a smooth section with the hot-mix, and the strips at the gutters for a width of 2 feet sealed with asphalt furnished by the Standard Oil Co. of Ohio, in drums, melted down in a large Littleford asphalt kettle and spread with Littleford squeegees. The area for about 6 inches around all manholes and catch-basins was similarly treated by hand painting with the asphalt.

A special aluminum template was

B. F. Patterson Hauled Hot-Mix 24 Miles from Plant, Laid Smooth Top with Hand Spreading and New Type Roller

made by Jaeger for this job and was used by the engineers in setting the grade for the forms as well as by the contractor, and inspectors in checking the final crown and grade of the finished pavement. This 30-foot template was set down on the old brick pavement every 20 feet to determine the minimum grade. A gage set at the end of the template gave the reading for the height of the forms above the pavement for a minimum section of hot-mix to be applied at that point. These readings were taken by the state engineers and integrated so as to adjust the final grade for smoothness.

The contract required running a wedge course or leveling course, a 1-inch binder course and a 1-inch top course. On one section about 1,500 feet long the street car rail was high. This was removed and the entire brick paving between the tracks removed and replaced with black base. The crown of the old brick pavement was so variable that it was deemed best to conform to it as far as possible because of the numerous intersections. This necessitated changing the crown of the screed on the finishing machine for seven different curvatures. The wedge course and binder course were run with extension plates in four sections on the finisher and equipped with springs so that they would jump up when they hit high spots. The inequality of the brick made this necessary.

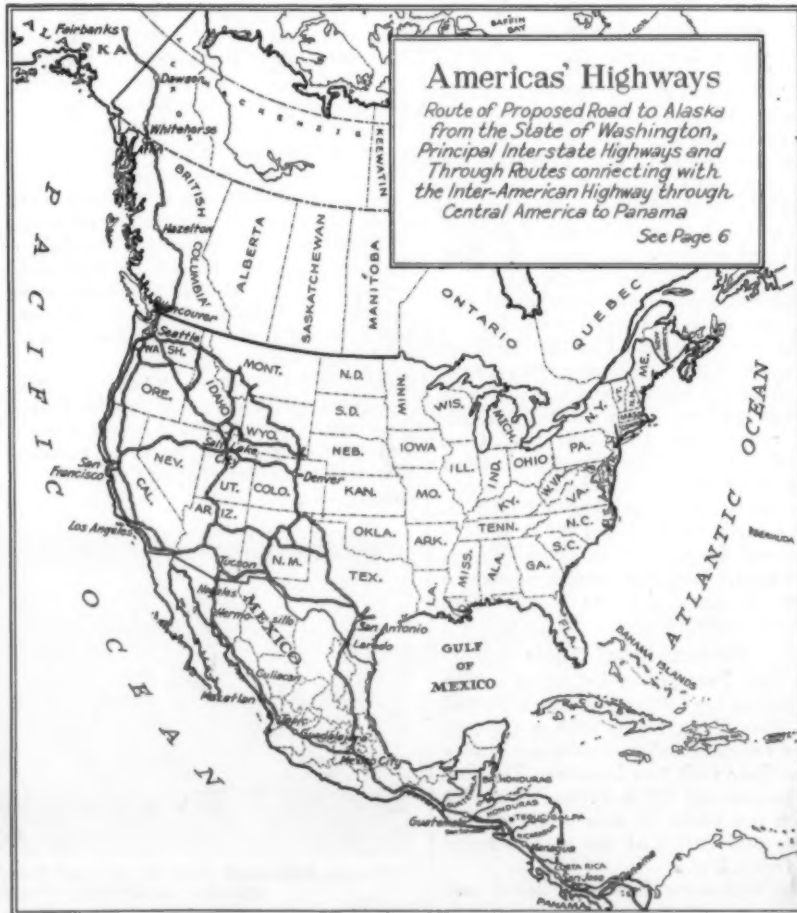
Novel Method of Setting Forms

The Heltzel steel forms were set uniformly 30 feet apart on a sand and asphalt mastic for a firm and uniform bearing. Four men were used in spreading and hand tamping the mastic and setting the forms. The forms were left exactly to line and with the pins laid alongside the holes. The 10-foot forms were made with holes for three pins but only two were used, namely the two end ones. As driving pins through a standard brick pavement is not an easy job, the contractor used a scheme which he developed last year when running hot-mix as a resurfacing for a macadam road. A pair of jack hammers drilled the holes and drove the pins easily and quickly with only two men on the job instead of six or eight.

Placing Hot-Mix on 60-Foot Section

One of the prettiest organization jobs we have seen for some time was clicking on the 60-foot section of the two U.S. routes, 23 and 42, in Delaware. A

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Deck of Steel Bridge Poured in Novel Forms

By J. E. RAFFENSPERGER, Resident
Engineer, Illinois State Highway
Department

(Photos on page 48)

A SUPERINTENDENT made the remark that in all of his thirty years of construction work, he had never before seen so much interest in a local project, nor had he ever worked before a larger spectators' gallery, than gathered to watch every construction detail of the new Illinois River bridge at Henry, Ill. Some may have appreciated the massive piers which rested on 190 oak piles 42 feet below the surface of the river, and rose 52 feet above the surface; and others noted the speed and ease with which the huge pieces of steel were swung into place. However, the smoothness of the floor and the neat lines of the curbs attracted the attention of the greatest number of the amateur inspectors who walked out on the nearly completed structure which means to them many years of smooth swift rides across the river to or from this century-old town of Henry.



Detail of the Chairs

On April 3, 1935, Stresenreuter Bros. unloaded their equipment, preparatory to laying the floor on the 1,718-foot high-level bridge, consisting of eight 43-foot deck spans, five 200-foot truss spans, and a 363-foot 10-inch truss channel span. The work proceeded from the Henry end, on across the river. It was decided to divide the bridge into four sections, as it was impractical to form more than 500 feet at one time.

The first section consisted of two 43-foot and two 200-foot spans. The second section was the channel span. The third consisted of two 200-foot spans, and the last was the remaining 200-foot span and six 43-foot spans. The working schedule called for a completed section every two weeks, but continued rains slowed up the progress about two weeks.

Design of Slab

The 7-inch slab is 21 feet 9 inches wide between curbs, 10 inches high, 7½ inches thick at the base, and 6 inches thick at the top. The reinforcing consisted of ½-inch square bars on 4-inch centers, 1½ inches from the bottom, and ½-inch square bars on 4-inch centers 2 inches from the surface with bends projecting to near the top of the curb. The temperature or longitudinal bars are ½-inch square bars on 12-inch centers, alternate top and bottom. The entire floor contains 918.3 cubic yards of Class X concrete, 255,330 pounds of reinforcing steel, and 140 3-inch galvanized wrought iron drains.

Forms

The methods used in constructing and setting the bottom forms were particularly interesting. The forms were built up in panels 4 feet 9 inches wide by 8 feet long, each panel being made of 1-inch surfaced lumber nailed on five 2 x 6's. Three of these panels

Stresenreuter Bros. Subcontractor for Slab of Henry, Ill., Bridge Used Flexible Panels

covered one bay between stringers and floor beams. They rested on fourteen chairs made of 2 x 4's 5 feet 4 inches long, with 2 x 2-inch legs on each end, which stood on the lower flange of the stringers.

The chairs were held together by 1 x 4-inch strips on each end, one nail at each joint; thus the section could be warped enough to be set in place. After the panels were placed, it was necessary to tack strips of tin over the cracks along the stringers and floor beams to prevent loss of mortar due to vibration. To remove the forms, the chairs were pushed over, allowing the panels to drop down; both the panels and chairs were then ready to be placed on the next section. These panels were used four times on this job, besides being used last season on a similar bridge, and are still in fair condition. For the beam spans, as the flange was wider, part of the panels had to be cut down to 4 feet 7 inches wide.



Laying a Section of Forms

The side forms were made of 2 x 10-inch and 2 x 8-inch surfaced planks held together by 1 x 3-inch cleats. By using 2-inch lumber it was easier to maintain neat lines; then too, it could be used many times.

After the panels were built, it took six carpenters, four laborers and a foreman about 16 hours to set the forms for a 200-foot span. After the forms for a section were in place, seven iron workers, assisted by three laborers carrying the bars, set the reinforcing steel for a 200-foot span in an 8-hour day.

Concreting

The proportion for the concrete was determined by the mortar void method and designed to produce a modulus of rupture of 650 pounds per square inch

(Continued on page 15)

Costs for Chlorides in Stabilized Roads

Two 3.65-Mile Sections
Treated with Common Salt
and Calcium Chloride in
Northern Virginia

By J. J. FORRER, Maintenance Engineer
for Virginia

ROUTE 55 will, in time, become one of Virginia's most heavily traveled highways, being the most direct route from the rich Shenandoah Valley to Washington, D. C., and other points north. The grades over the mountains will be easy and there will be no curves of consequence. The route passes through Front Royal, the northern terminus of the recently constructed Skyline Drive, which from this point extends some 75 miles south along the crest of the Blue Ridge Mountain. The section of the Skyline Drive now open has been visited by more than a million people in less than a year.

Due to the fact that the whole route will be unfit for through traffic until constructed in its entirety, only a temporary soil or sand-clay surface, 10-inch compacted, is being used to carry the local traffic. This might be consid-

(Continued on page 16)

Pouring 5.5 Miles in One Month

THREE contracts totaling 37 miles were awarded to the Broussard-Warfield Co. of Beaumont, Texas, on November 27, 1934. The contracts were formally entered February 7, 1935 and grading started February 20, followed by pouring of the first section of slab on March 1. By getting the early start with a break in the weather which was unusually good last spring, instead of wet, the contractor was able to end the month with 5½ miles of slab completed. The work was finished in December, 1935. The average daily pour was 1,500 feet of 16-foot, 9-6-9-inch slab, using 10-hour shifts and running the same labor crew for the last three days of a week and the first three of the next and then shifting to a new crew.

One Batch Set-Up for 10.06 Miles

The first batching set-up was at Sweeney, Texas, from which 10.06 miles of pavement was poured. Then the plant was moved to West Columbia, the site of the first capital of the Texas Republic in 1836-1837. The first location was within 1 mile of the end of the contract and necessitated a maximum of 30 batch trucks for the longest haul.

With the specifications requiring that all aggregates be stockpiled for 24 hours the contractor had the choice of using two batching plants or two cranes. He chose the latter, using a P & H with a Hayward bucket on sand and a Koching crane with an Owen bucket on gravel. A wood bin was erected, using Blaw-Knox batchers and Howe scales. The batches were weighed out with 1,332 pounds of sand and 2,721 pounds of gravel, loose dry weights, and 6 bags of cement. Two men loaded the cement from the cars, and one man cut the sacks near the plant.

Preparation of Grade

A Carr Formgrader led off in cutting the trench for setting the 9-inch Heltzel and Blaw-Knox forms with a crew of three laborers and a form setter, and a form liner with two laborers. The fine grade was cut by a Flynn Surgrader which ran under its own power on the forms and delivered the spoil outside the forms.

The contractor developed heavy cast

Broussard-Warfield Co. Hit Record for Spring on 16-Foot PWC Project in Brazoria County, Tex.

(Photo on page 48)

iron clamps which, with but one pin each, held the expansion joint headers in place. Three of these clamps did the trick with the sheet steel header boards and proved so successful that other contractors working in the same territory have bought duplicates from Broussard-Warfield for their work.

Concreting

The batch trucks worked outside the forms throughout the contract even on widened sections at curves. This brought some tight places where on a jetted fill the shoulders were low and still boggy. The trucks were then run on wood mats to prevent tie-ups. Five men worked in the mud on the widened curves and two of them spaded the sides; one man was dropped from this crew when running on tangents. The operator of the Multi-Foote 27-E paver spread the material very effectively so that the work was speeded up, helping greatly in making the remarkable record in the first month of operation.

The steel was placed by two men, one on center steel and one on the side bars. The latter were supported by the standard type of rig with levers to release the steel when the supports were withdrawn.

Large Labor Crew Pushed Work

A Lakewood finisher with double screed carried widening sections so that it could be continued in use throughout the work and eliminate the somewhat unsatisfactory screeding and finishing by hand that must be done if the machine is removed and taken ahead to the next tangent. The center strip was set with a Flexible Joint machine operated by one man.

A 14-foot Carr steel bullfloat operated from a Heltzel steel bridge smoothed out the wrinkles in the slab and was operated by two men from a pair of separate wood bridges which had to be brought up one at a time every time the float was moved ahead. There were two finishers for the straight-edging and belts and one man for joint finishing. A separate foreman was in charge of the finishing instead of leaving this work to the concrete foreman.

Burlap for the initial curing was spread right behind the finishers by two men and it was sprinkled at once by the man on the hose. The burlap was removed the next morning and after checking the slab was covered with earth. A plow outfit and blade kept the earth along the shoulder well loosened and windrowed so that it could be shoveled onto the slab by the 20 men who stripped the forms, covered the slab and filled the expansion joints with a mixture of oiled sawdust and asphalt to within 1 inch of the top and then sealed them with asphalt.

(Continued on page 33)



Dowels, Expansion Joint Header and Reinforcing Steel in Place. Note the Special Bracket for Holding Header Firm and Perpendicular.



Constructing TEXACO Sheet Asphalt pavement on Broadway, Schenectady, N.Y.—part of this city's 500,000 sq. yds. of TEXACO.

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Are We Looking at Public Works in the Right Light?

Year after year, back in the "good old days" before 1929, the bill for public works in the United States was written in billions of dollars. Highways alone reached one billion. Then came the late lamented depression and public works were about to vanish from the scene because tax strikes and personal postponements of tax payments crippled the finances of cities and states.

The Hoover administration voted two emergency appropriations to continue state highway construction as the one public works activity which had plans aplenty ready for use and which employed labor of all kinds, local and distant, direct and indirect, unskilled and skilled. The New Deal took up the spending of public funds with a lavish hand, featuring Public Works but including under that broad heading many activities and projects that stretched even the breadth of that wide compassing term.

Today the man on the street looks upon Public Works as something to spend money on to stop a depression. Admirable as large Federal expenditures for public works may be as a re-employment measure in times of financial stress, we must not look upon such construction merely as a stop-gap to check the tide of unemployment.

Long-term planning for public works is needed if this country is to continue its program of improvement of living conditions, transportation facilities, recreational areas, and utilitarian activities. These works divide themselves into public facilities and job makers. Therefore, our long-term planning

should include all kinds of public works, the necessary facilities to be constructed from year to year and the job-making variety to be featured in times of depression.

What we call "public facilities" include the construction of highways, water and sewage works, bridges and tunnels, dams for power for flood control and for conservation, and river and harbor improvements. The "job makers" are the type now being done by the Civilian Conservation Corps and include such activities as the building of fire roads and trails in national forests, other conservation activities such as reforestation, the wholesale construction of sidewalks in which man-power is an important element, the clearing away of condemned buildings, the cleaning of vacant lots in cities, the general improvement and landscaping of old abandoned dumps and automobile graveyards and similar civic activities.

In the wild scramble to absorb the unemployed, we have lost sight of what Public Works really means. It is the creation of structures from public funds by the people for the education, health, transportation and recreation of the human race. With a planned Public Works program of socially and economically justifiable public facilities, and an auxiliary program of job makers also planned in advance and ready to absorb a great volume of man-power when unemployment mounts high, Public Works will assume its proper place in the normal activities of this country.

Trans-Florida Canal Starts in Earnest

There is a new Mason-Dixon line, this time located somewhere between Jacksonville and Miami in the fruitless state of Florida. This new divider of opinion is the Trans-Florida Canal. If you live in Jacksonville, you favor it. If you live in South Florida, the construction of the canal promises something akin to complete destruction of all of the water supplies and prosperity of that great southern peninsula.

Whether you are pro or con, the Trans-Florida Canal is underway and the little town of Ocala is experiencing a gold rush boom as the geographical center of present activity because of its location mid-way on the route of the 195-mile canal.

The first shovelful of earth was a 12-yard scoopful moved under the supervision of the U. S. Engineers Department near Ocala and with hauls of 650 feet, the LeTourneau scraper powered by one of the new Caterpillar Ninety-Five tractors moved 76.2 cubic yards per hour on 30 cents of fuel oil.

Lt. Col. Brehon Somervell is Chief Engineer in charge of the project. The canal, estimated to cost \$146,000,000, will cross Florida from the mouth of the St. John's River near Mayport in the vicinity of Jacksonville to Port Inglis

on the Gulf of Mexico. The minimum depth will be 30 feet and the width will vary from 250 to 400 feet. The present plans call for the completion of this project within six years, and the moving of 570,000,000 cubic yards of material.

Reasons advanced for the construction of the Canal by its proponents are the saving of about two and one-half days on the trip between Atlantic and Gulf ports and the increased safety to shipping through the elimination of the dangerous run around the Florida Keys.

Sad But True

From an examination of 1934 traffic statistics in the U.S., it is found that by separating all our grade crossings, and assuming that no accidents take place afterward at the separations themselves, the total number of highway accidents will have been reduced by about 1/2 of 1 per cent. In the matter of deaths due to traffic accidents, they will be reduced about 3 per cent.—California Highways and Public Works

Some recent progress in the development of definite designs for concrete mixes has been made by European engineers who have harked back to the use of grading curves such as were in vogue before the water-cement ratio principle was recognized.

One Highway Hazard Could Be Avoided

Not long ago there existed in industry many examples of moving parts, such as exposed belts, uncovered gears, unprotected saws and cutting tools, which sometimes did men to death or left them maimed for life. There was not much excuse for the skillful operator to come in contact with these things but he did, and the accident rate was excessive. At length the safety engineers put a stop to most of this. And yet, it is safe to say that there never existed in the field of industry so deadly a moving object and one which came so close to so many people as the other fellow's automobile that we meet on the road. H. C. Dickinson, Chief, Division of Heat and Power of the National Bureau of Standards, points out in a recent issue of *Highway Research Abstracts*. Whenever two cars meet on an 18 or even 20-foot road they commonly pass within 2 feet of each other at relative speeds which would prove fatal to most of the occupants if they should collide. Even speeds of 20 miles an hour would commonly be fatal.

On 40 miles of road carrying 1,000 cars an hour each way there will be about a million cases of cars meeting each other every hour. The number of such hazards per year runs into staggering astronomical figures. Each car is steered by a fallible human being who may cause a fatal accident by a second's inattention or carelessness. Turning the front wheels a fraction of a degree in the wrong place at the wrong time may snuff out his life or the lives of others. Is it to be wondered at that a large part of the fatal accidents that occur on the open road result from the fact that drivers must meet other vehicles with so narrow a margin of safety? The wonder is that any of us survive. The unprotected hazard of passing vehicles is perhaps millions of times as great as any hazard of moving parts which has been eliminated in the safety campaigns in industry.

Why do we tolerate this, and forget its existence? Probably because we once drove horses and they mostly looked out for themselves. Because we have so long been used to meeting other vehicles we seem grossly to underrate that hazard in modern traffic. There is no such thing as safe speed for head-on collisions; yet we invite billions of them each year.

We never should have built, and now should stop building, main thoroughfares carrying heavy traffic in both directions on the same pavement. The tardy recognition of this fact in the construction of a few of the most heavily traveled roads only emphasizes the inequities of the past. If we really want to reduce the accident toll we can go far

by insisting on separation of traffic, wherever possible.

Modern motor cars will continue to be driven at high speeds unless human nature changes, which is not likely. The cars will do this safely if they do not hit something substantial. On most of our roads there need not be anything substantial on the right-of-way or near it to run into, except the fellow we meet. If we do not have to meet him, and if the trees and telegraph poles which should not be there are taken away, the chances for serious accidents on these roads will be slight.

Snow Control as Important as Snow Removal

Snow control should be particularly emphasized, because snow plowing or removal is only one phase of a properly balanced winter road program, says Alan K. Hay, Engineer to the Ottawa Suburban Roads Commission, in a recent issue of *Engineering and Contract Record*.

Drift prevention by the removal of natural obstacles, by the use of portable fencing and, in the case of new roads, by built-in features is fully as important as the removal of the snow. New road grades are now being constructed with an eye to their possibilities for impeding or assisting the passage of moving snow. Much is done in the elimination of minor obstacles along the right-of-way, and there are even occasions where, in relocating portions of a road to by-pass difficult territory, the thought that the new location would be less exposed to severe winter conditions is a determining factor in making the change.

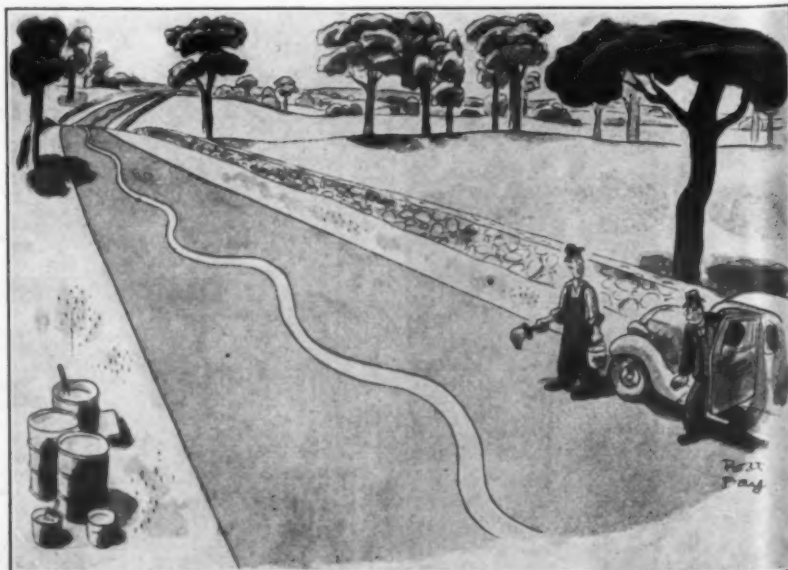
Accident Studies in Mass.

The accident records of a motor registry branch of the Massachusetts Department of Public Works show the following number of accidents per million vehicles on roads of different widths.

On 2-lane roads	1.37
On 3-lane roads	1.40
On 4-lane undivided roads	0.94
On 4-lane divided roads	0.51

According to J. A. Johnston, District Highway Engineer, Massachusetts Department of Public Works, this study shows that no more 3-lane roads should be built and that as soon as funds are available, such roads now built should be widened.

The recent order for 4,220,000 barrels of modified portland cement awarded by the U. S. Reclamation Service to five portland cement manufacturers of the Pacific northwest will require a string of box cars 110 miles long and the railroads will receive freight charges of \$2,637,000.



Courtesy, The New Yorker and Robert Day

"It Was My Own Idea, to Keep Drivers Alert."

Short Labor Shifts Speeds Tappan Dam

TAPPAN Dam of the Muskingum Conservancy Project in eastern Ohio is located east of Dennison and Uhrichsville on Little Stillwater Creek. It is an earth dam 1,650 feet in length and 50 feet high on an impervious foundation and with a saddle spillway. A tunnel through a rock knoll at the south end of the dam will serve as the outlet and have three $3\frac{1}{2}$ x 7-foot gates to control the flow. The drainage area above the dam is 71 square miles and the storage behind the dam will provide 35,100 acre-feet for conservancy purposes and an additional 26,500 acre-feet for flood control.

The contract for the construction of Tappan Dam was awarded to Sammons-Robertson Co., of Huntington, W. Va., on November 24, 1934, for \$387,450. The work includes 104,000 cubic yards of common excavation, 39,000 cubic yards of rock and 1,750 cubic yards of tunnel excavation. The embankment will require 450,000 cubic yards of borrow although a small portion of the material was removed from the access road and used in the embankment. There will be 3,500 cubic yards of concrete in the control works. The embankment is spread in 6-inch layers loose and rolled to maximum density with a sheepfoot roller using sufficient water to insure compaction. The downstream slope is 1 on $2\frac{1}{2}$ and the upstream slope the same.

Borrow and Embankment

The borrow pit located over the hill from the embankment, about 2,000 feet average haul, was stripped and then the Caterpillar 48-inch power-operated elevating grader pulled by a Caterpillar Seventy gas tractor loaded the continuous string of hauling equipment. These included five 6-yard International trucks with Aristocrat steel bodies and St. Paul hydraulic hoists, six 12-yard Euclid Trac-Truks with Goodyear doughnut tires and three 8-yard Euclid crawler wagons hauled by Caterpillar Fifty diesels.

As with all of the dams on this project considerable trouble was experienced in getting started because of the heavy rains. Soon after the base was plowed the rains started and held up the placing of any large amount of material in the embankment. In the early stages when it was hoped that considerable progress might be made it was sometimes necessary to use two tractors on the crawler wagons when they reached soft portions of the embankment near the hill and over which they had to be hauled to reach the more distant and drier portions. Even with two tractors it was sometimes necessary to put a bulldozer behind in order to get through the soft spots.

The embankment was spread by two Caterpillar tractors with Euclid bulldozers, a Fifty diesel and a Sixty gas machine. Another gas Sixty was used to pull the Euclid sheepfoot roller in tandem with a Blaw-Knox sheepfoot roller, upon which all rolling fell. In order to keep the road over the hill in shape for the rolling stock to make the best speed a Caterpillar 12-foot blade grader pulled by a Seventy gas tractor was constantly in service.

Cutting the Access Road

The access road, which will run over the top of the completed dam, was cut with a pair of Lorain 75 gas shovels. This material, mostly loose rock, was placed in the lower section of the dam and assisted greatly in stabilizing the wet base. After the two shovels were cut off and the work carried on under more normal conditions with dry ma-

Sammons & Robertson Use Trucks and Trailers Hauling to Embankment, Tunnel Concrete Lined

terial placed and wet down according to the instructions of the special inspector on earth embankment, the contractor was able to place between 4,000 and 5,000 cubic yards of material in the embankment per 15-hour day. The organization worked three 5-hour shifts to get the maximum out of the men and without the inevitable losses from fatigue when a labor organization is worked at top speed for a full 8 hours. The labor group varied from 140 to 150 men total for all shifts. For early



C. & E. M. Photo

Dumping and Bulldozing at Tappan Dam

hours and late the contractor provided floodlights both in the borrow pit and on the dam, using commercial power brought in from the lines along the highway.

Water In and Water Out

During the early stages of the work the removal of water from the toe trench was a matter of considerable concern.

The toe trench, which is filled with a filter of gravel on the sides and bottom and then filled with one-man stone and larger, was a godsend to the contractor in providing a drainage trench for the entire project. Without it the delays would have been greater. A Humphreys double-diaphragm pump was used to pump out the water in the toe trench.

(Continued on page 28)

a new
NORTHWEST
full-revolving
 $\frac{3}{8}$ Yd. Shovel!

Big
Machine Quality
at an attractive price

NEVER before
a small machine like this!

A small and lighter **NORTHWEST** of "Sensible Weight" which insures sturdiness, strength and durability — not a "skinned down" weight built purely for price.

SUPER MOBILITY—maneuvers with the ease of a tractor! Steering controlled by the operator with the cab in any position.

FEATHER TOUCH CLUTCH CONTROL operation.

NORTHWEST INDEPENDENT CROWD—utilizes power other shovels waste.

BALL OR ROLLER BEARINGS on all high speed shafts.

FULLY ENCLOSED CAB—Operator protected in all kinds of weather.

LOADS ON A TRUCK OR TRAILER—take it anywhere at motor truck speed.

And there it is! A compact tool for a man sized job! Full-revolving, convertible, mobile and powerful! Be sure to see it before you buy.

Good Roads Make Good Neighbors

Road System Sponsored from Canada to Argentine, Central American Section Aided by United States

(Photo on page 48)

THE "Good Neighbor" has become a familiar phrase during the present administration in Washington but it is not an original one. The roadbuilders of the world long ago discovered that good neighbors are developed by good roads. And it is this simple philosophy which was in the back of the minds of the promoters of a Pan-American Highway as long ago as 1929 when the idea of a road system from Alaska to the Argentine was first conceived.

Emphasis since that time has been placed upon the development of a highway from the Rio Grande through the Central America countries to Panama, which would connect at each of the termini with the existing roads in the United States and South America to form eventually a passable highway from one end of the Americas to the other.

Status of Inter-American Highway

Every one of the Central American countries, Mexico, Guatemala, Honduras, Nicaragua, El Salvador, Costa Rica and Panama, is enthusiastic about the idea. The main stumbling block up to the present time has been the financing of such a project.

Although the development of such a method of transportation, more flexible and less costly than railroads, would bring to these countries not only economic benefits but also the advantages of communication and human contact, the present financial condition of all the Central American countries prohibits an extensive road building program and these same countries, while granting enthusiastically the benefits to be derived from such a program, hesitate to allow foreign funds to pour into the country to make such a project possible, bringing with them foreign control of such an important means of communication.

In spite of this, some work has been done and the latest development in the project is a plan submitted by the United States to these countries, whereby the United States Government will cooperate in the construction of several major bridges along the route of the highway.

In addition, the U. S. Government has offered to carry out at its own expense all surveying, drilling and excavations; supply plans, specifications and estimates; furnish steel or any other manufactured material whether it be for permanent use in the construction of bridges or roads or for temporary use; transport all materials furnished by the U. S.; construct all superstructures; supervise all construction until its completion; and supply all inspectors or supervisors who may be needed at any time.

The Central American countries, on the other hand, must supply all native materials, such as lumber, sand and gravel; all work required in the construction of foundations and for the demolishing of all structures not required after the completion of the route; labor in the preparation and clearing of the highway route and the leveling and grading of all roads that are branches of the proposed highway and pay for the transportation of all native materials used.

An appropriation of \$5,000,000 was requested from Congress, which it was estimated would construct a passable

dirt road, connecting up with the present stretches of road and make the Inter-American Highway a reality. Only \$1,000,000 was appropriated, however, which is being used for surveys and the plans and construction of four major bridge structures, one a 500-foot suspension bridge over the Chiriqui River about 7 miles east of David in Panama, a bridge at Ochomogo, Nicaragua, another across the Choluteca River near the town of that name in Honduras and a fourth over the Tamasulapa in southern Guatemala. The cost of these bridges will run from \$100,000 to \$180,000 each. The respective countries concerned will contribute the foundations and piers and probably the ordinary labor for seating the steel structure to be contributed by the U. S. The engineering work is in charge of O. E. Malsbury, for many years an engineer in the Canal Zone, whose services were loaned by the Panama Canal to the Inter-American Highway project.

The report of a reconnaissance survey for the Inter-American Highway includes information on the number of

principal stream crossings in each of the Central American countries which require bridges ranging from 20 to 1000 feet in span. Some of these streams are already bridged by adequate structures, others have bridges of a sort which must be widened and strengthened to meet the requirements of such a highway and others are crossed by the grace of God and the ability of the driver and car to plunge down into the stream and land in safety on the opposite bank.

Countries	No. of Principal Stream Crossings	Miles of Highway
Mexico	—	1,728.3
Guatemala	45	110.4
El Salvador	13	183.3
Honduras	18	87.4
Nicaragua	30	214.0
Costa Rica	66	356.3
Panama	16*	367.1

*Between David and the Costa Rica Line. There is a good road from Panama City to David.

Mexico

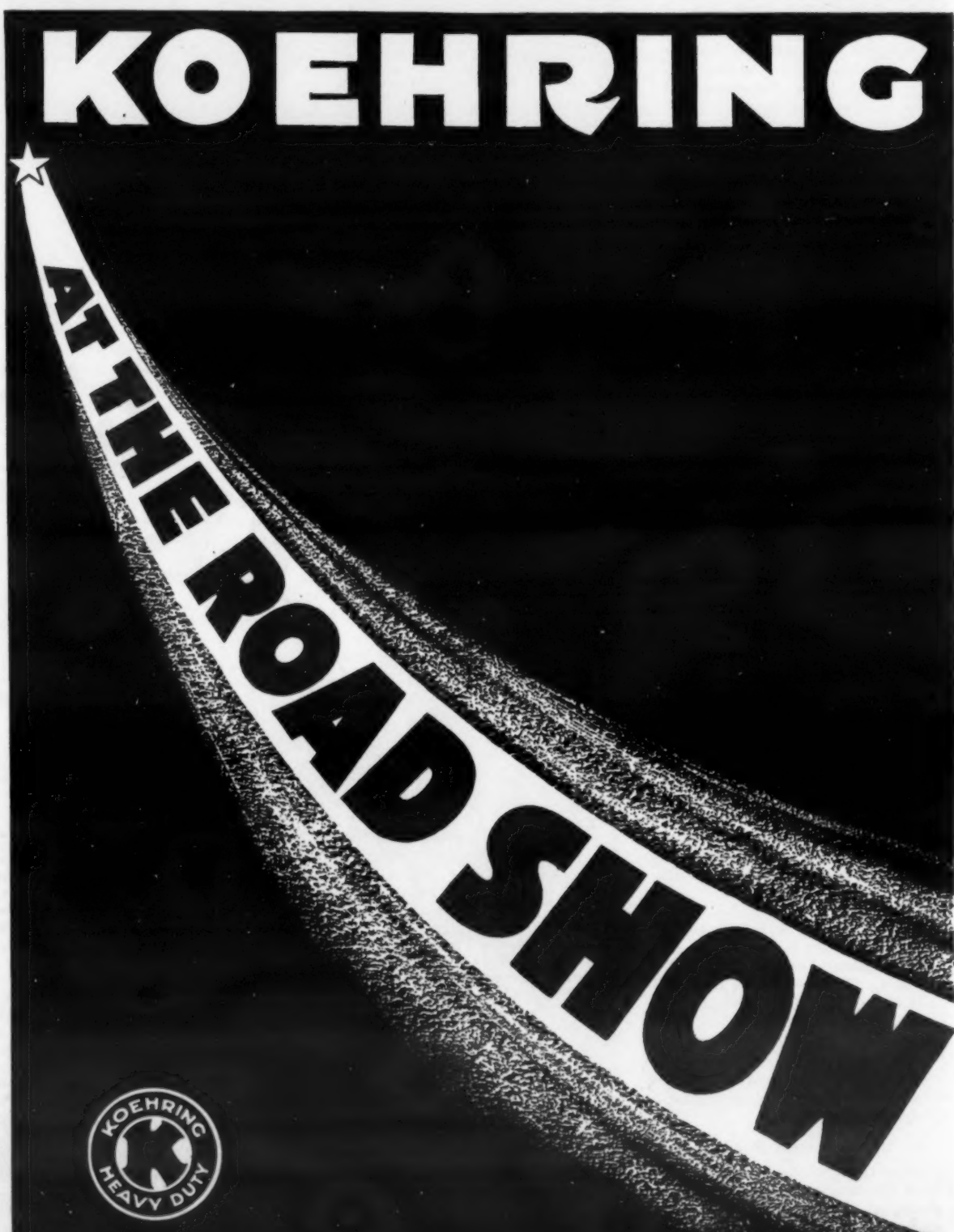
For several years the Republic of Mexico has been engaged in a systematic and far-sighted program of highway construction. Started in the administration of President Calles, the work has been pushed with vigor and enthusiasm.

Foremost among the construction projects in Mexico is that section of the Inter-American Highway from Nuevo Laredo on the Rio Grande to Mexico City, a distance of 765 miles. The Mexicans have gone at this piece of work with religious zeal and, with justifiable pride, formally opened the highway last November. The road, which in some sections is concrete and in others surface-treated gravel, passes through very mountainous country which will be a joy to the motorist and sight-seer but provided plenty of head-aches for the Mexican engineers during its construction.


The line of the proposed Inter-American Highway from Mexico City south has been fixed definitely as far south as Tehuacan and the general route is known from that place to Oaxaca and Mitla, following existing roads. Beyond Mitla to the Guatemala boundary, the location has been studied although some sections have not yet been thoroughly reconnoitered and the final plans have not been made. It is estimated

(Continued on following page)

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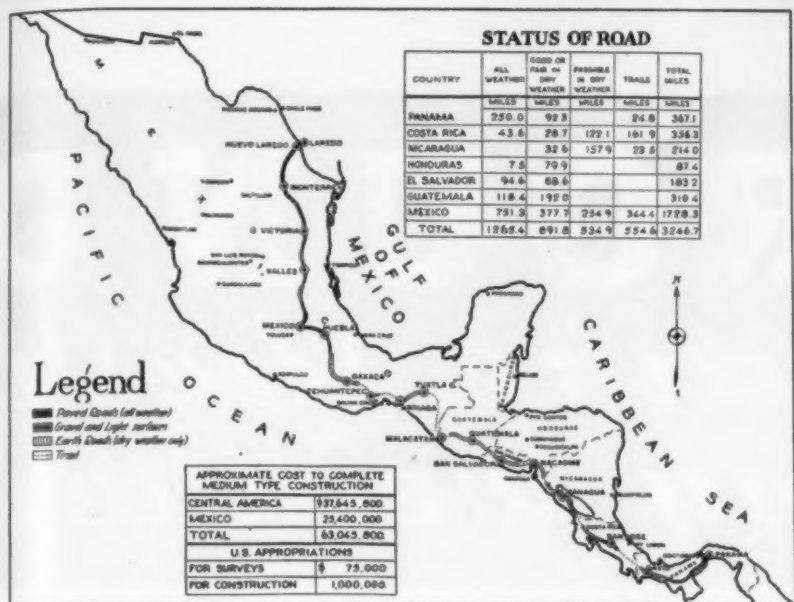


AT THE ROAD SHOW



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The Route and Condition of the Inter-American Highway Through Mexico and Central America

that the total length of the highway through Mexico will be 1,728.3 miles.

Guatemala

Guatemala has three groups of highways; those roads which serve the highland section of southern Guatemala; the roads connecting Coban with Panajhe and El Rancho; and the service roads leading from the coffee-producing areas to the International Railway. Under President Ubico, a highway program as vigorous as finances would permit has been maintained.

In 1931, Guatemala had 15 miles of macadam road, 146 miles of gravel road, 385 miles of dirt road, with first improvements, 100 miles of partially improved dirt roads and 721 miles of totally unimproved dirt roads.

As in the case of most of the Central American countries, the Pacific side of Guatemala seems to be most favorable for highway construction. The route of the proposed road through Guatemala will be along the elevated plateau which forms the intensely cultivated section of the country, where approximately 50 per cent of the inhabitants live. Transportation in the entire region is dependent on highways, and their development will greatly facilitate the movement of industrial and agricultural commodities.

A road, passable in the dry season, is now in existence extending from the El Salvador line to Mexico, 118 miles of which would become a part of the Inter-American highway. The total length of the highway, which would pass through Guatemala City, the capital, to the Salvador boundary near the village of San Cristobal, will be 310 miles.

El Salvador

No survey has been made through El Salvador for the Inter-American Highway, but the termini for the route would be the one named above on the north and the Santa Clara Bridge on the Rio

Goascoran, the boundary between Honduras and Salvador. It would, of course, pass through San Salvador and would total 183 miles in length.

The present highway system of El Salvador consists of about 30 miles of asphalt roads, 900 miles of dirt roads, passable but rough in the rainy season, and 2,200 miles of unimproved dirt roads which are in reality only ox-cart trails.

Honduras

The Inter-American Highway would pass through only a small section of Honduras, 87.4 miles, but would connect with a highway now in existence between Tegucigalpa, the capital, and San Lorenzo, on the Pacific Coast, a distance of 81 miles, in order that the capital of Honduras might be brought into easy communication with the other capitals of Central America and to give to a greater area of Honduras the benefits of the highway than would be possible by routing the highway across one corner of the country.

Most of the 611 miles of road now in

existence in Honduras are very poor. Figures show that in 1932 there were 132 miles of waterbound macadam, 184 miles of dirt roads graded and drained and 295 miles of dirt roads passable only in the dry season.

The road from Tegucigalpa to San Lorenzo is reported good in the dry season but is heavy when wet. The average grade is 8 per cent and some idea of what travel is like in these countries may be gained from the fact that the bus takes from five to eight hours for this 81-mile trip.

Nicaragua

There are at present 897 miles of highways in Nicaragua, of which there are 381 miles graded and drained; 513 miles, earth; and 3 miles of asphalt, the latter being paved streets in Managua, the capital. The earth roads are passable only in dry weather. All roads are in the western section of the country and transportation on the east coast is restricted to mule-back on land and small boats on the rivers. Practically

(Continued on page 37)

Bid it Right *forget the old stuff!*



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75,000 yards of this concrete was pumped into the caissons with 4 Rex Pumpcretes.

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Firestone patented construction features are responsible for the amazing success of the new

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with its scientifically designed and widely spaced bars of tougher rubber, gives you super-traction, and is self-cleaning. Of equal importance is the fact that the body of this tire is built with Gum-Dipped high stretch cords, giving the tire great strength to withstand the terrific stresses and strains of heavy pulling with low air pressure. In addition, there are two extra layers of Gum-Dipped cords under the tread, locking it inseparably to the cord body. These are patented Firestone construction features used in no other tire.

Equip now with Firestone Ground Grip Tires—they will save time and money for you on every job. When ordering new equipment be sure to specify Firestone Ground Grip Tires—the greatest traction tires ever built.

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Firestone



Air Map Ground Work on Colorado Survey

Control Survey Story Sounds Like Pioneers But Safety Assured by Radio and Equipment

THE ground control survey for the extensive Colorado River aerial map is now under way. This work means the establishment of the exact latitude, longitude and altitude of 180 control points. This relatively large number for the area involved is required for the operation of the stereoplanograph in working up the contour map of the 50-mile survey of the Colorado River between Diamond Creek and Pierce's Landing, both in Arizona. The sheer walls of the canyon, the rapids and the turbulent water make it impossible for boats or men to turn back once they have started. The river can be reached from the outside at only one place between the above points and that only by experts. This is at Spencer Canyon, about one-third the distance from the starting point. The worst rapids are in the first 25 miles. A group of engineers of the Fairchild Aerial Surveys of Los Angeles and of the Soil Conservation Service of the U. S. Department of Agriculture is now making this survey under the direction of Charles W. Collier of the Soil Conservation Service, Washington.

Two trips have been made through this hazardous section of the Colorado River by Fairchild and Government engineers. The lives of the personnel and the safety of the valuable equipment carried have been safeguarded by the latest and best equipment specially designed by experienced river men. Thus, the survey can be said to be difficult, because of the natural obstacles to be encountered, but not hazardous.

Special Equipment

The expedition has four specially built boats. They are made of 1½-inch solid oak with watertight bulkheads fore and aft. They are designed to proceed downstream stern first with the riverman in the center cockpit handling the oars and a member of the expedition lying prone on each bulkhead. The men wear football helmets and padded lifejackets, just in case a boat happens to capsize. Supplies are carried in watertight containers. The portable short wave radio, which is one of the most valuable items of equipment, is carried in watertight cans, including the motor generator set.

Two trips were made through the river. The first started from Diamond Creek on September 5 and was completed 28 days later on October 23. Three boats carrying eight men made the first trip. This was to cache supplies and make a general reconnaissance of the river and the sides of the canyon with the actual survey in view. By means of the radio, it was possible to estimate within certain limits when the party would reach Pierce's Ferry. Trucks were dispatched from Kingman, Arizona, 60 miles away, in accordance with the estimate and trucks and boats arrived at the landing within ten minutes of each other. The trucks carried the equipment back toward Iron Creek but Indians and drays were required to negotiate the last 10 miles over the all-but-impassable road into Diamond Creek. The second expedition left Diamond Creek November 1 and arrived at Pierce's Ferry December 10. Food and supplies for sixty days were carried on each trip. The full complement of twelve men made the second trip, including four boatmen and two Soil Conservation engineers.

Most of the control points are being established along what is known as the first bench of the canyon, a shelf averaging about 1,000 feet above the river level. In line with the policy of making the venture safe and successful in every way, the engineers are not allowed to do any climbing after dark.

Signals

In order to keep the men manning the boats and the surveyors from losing contact with each other a set of signals has been arranged. Other parties which have gone through the river have been able to camp wherever most propitious.

This expedition must camp where the job takes it. The boatmen have a small mortar and at 4 each afternoon the rivermen fire a bomb vertically into the air. It climbs about 800 feet, explodes and gives forth a cloud of smoke. The surveyors are on the alert for this signal and when it comes they know that the camp has been established directly below the cloud of smoke. Red railroad flares are also carried for signaling in case any one is caught out over night. The supplies also include almost 600 giant firecrackers. Each man carries a pocketful. These are fired singly or in rapid succession according to a

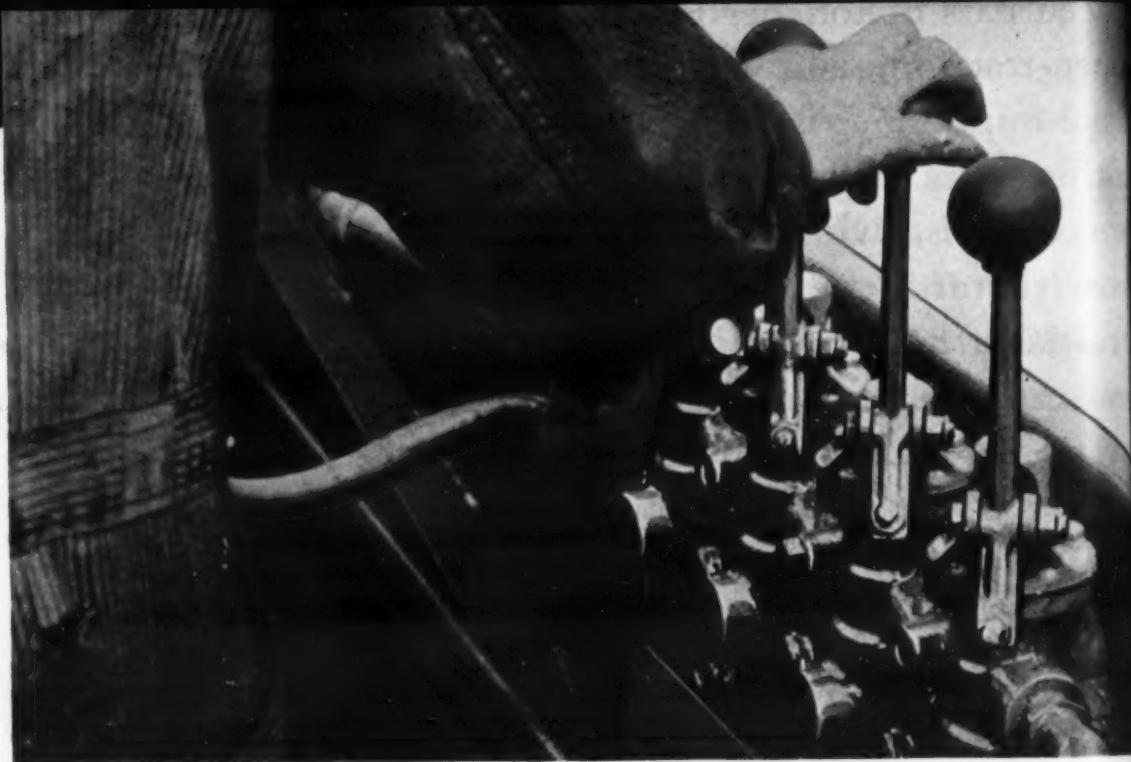
pre-arranged code.

The boats are portaged past the worst rapids. A large horizontal handle on the stern and a ring handle in the bow facilitate this. Only the rivermen go through the rapids, the character of which is studied carefully in advance by observing the action of sticks and pieces of wood thrown into the water.

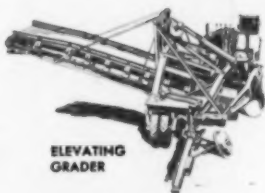
Radio Communication

The radio is invaluable in several ways. Regular communication is maintained between the party and the Fairchild headquarters in Los Angeles and

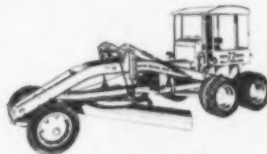
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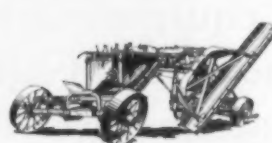
See Our Exhibit at the Cleveland Road Show, January 20-24



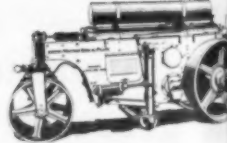
ELEVATING GRADER



MOTOR GRADER



BLADE GRADER



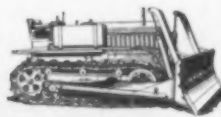
ROLL-A-PLANE



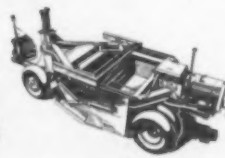
TRAIL CAR



MOTOR SWEEPER



TRAIL BUILDER



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SNOW PLOW

Austin-Western

Uncle Sam's Business and How He Handles It

Firms and individuals who enter into contracts with the Federal Government for construction work, or for the furnishing of supplies, must comply with certain regulations, as well as with the laws governing such matters. Ignorance of either the Government's regulations, or of the laws governing in the particular matters involved, does not excuse the contractor or supplier, in case he makes a mistake and suffers heavy loss. The Fidelity & Deposit Co., of Balti-

more, Maryland, has prepared a booklet as its contribution toward a clearer and more complete understanding of the Government's methods of doing business, as well as of the methods of recourse open to contractors and suppliers in the event they feel that the demands made upon them by the Government or its officials are unreasonable. The author, Col. O. R. McGuire, has been a Civil Service employee of the Federal Government for eighteen years and now is Counsel to the Comptroller General of the United States. This places him in a position to write with authority on the subject under discussion.

Copies of this booklet may be secured without cost or obligation by our readers by writing to D. C. Handy, Vice President, Fidelity & Deposit Co. of Maryland, Baltimore, Md., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

According to a California highway transportation survey in 1934, 72.4 per cent of a total of 818 loads of sand and gravel on which reports were received were moved by owner-operated motor trucks. Contract carriers moved 27.4 per cent, and 0.2 per cent were moved by common carriers.

Landscaping an Aid to Traffic Safety

In a paper which J. A. Johnston, District Highway Engineer, State Department of Public Works of Massachusetts, has presented before several civic bodies in that state, he has called attention to the costs of landscape work, including the planting and care of trees and shrubs, and their value as an aid to traffic safety.

The planting of trees and shrubs, preferably evergreens, pines, spruce or similar growths in the central dividing strip of a 4-lane divided road, similar to the Boston-Worcester Turnpike, would cut off the glare of approaching headlights that now blind the drivers of motor vehicles. The planting of trees is not expensive, costing probably not over \$1.50 each. Intervals of 15 feet is close enough, making the cost about 10 cents per linear foot of road. If the central dividing strip is planted with shrubs, it need only be 5 feet wide, saving about \$500 per mile in the cost of the grading, this saving paying for the shrubs.

Mr. Johnston also calls attention to the fact that the shrubs and trees will need trimming about once a year while grass must be mowed every week. Therefore, with the first cost no greater, the maintenance of the shrubbery is less.

Blaw-Knox Acquires Rights to Nickerson Road Finisher

The Blaw-Knox Co., Pittsburgh, Pa., has acquired the patent rights to the machine formerly known as the Nickerson road finisher, which will be called in the future the Blaw-Knox Road Finish-Spreader. The machine will be manufactured at the company's shops at Blawnox, Pa., and will be sold through the company's own sales force and its distributors.

The Blaw-Knox Road Finish-Spreader for bituminous material is manufactured in two sizes, "B" with a width of spread from 5 feet to 15 feet and "A" from 4 feet to 10 feet. It can be used for spreading and finishing all kinds of plant-mixed material, as well as stone, slag and gravel. It is adjustable for any shape of crown and the cross-section can be readily changed while in motion for banked curves, etc.

This spreader is simple in design and operation and rugged in construction. It is attached to the truck and spreads material while the truck is drawn forward during the dumping operation. Usually less than 3 minutes are required for the entire operation of attaching to the truck, spreading and detaching. It is portable and may be dragged from one job to another on its own wheels.

New Small Gas Engine of 1/2-Hp Weighs 26 Lbs.

For construction services requiring a small engine, the Lauson Co., New Holstein, Wis., has announced a new 1/2-hp 4-cycle ball-bearing engine weighing only 26 pounds. This unit is complete with an Eisemann magneto, balanced crankshaft and hardened and ground cams. It operates at speeds from 1800 to 3600 rpm developing from 1/2 to 3/4-horsepower depending upon the speed. Other equipment includes a flyball governor which maintains a close speed regulation for operating generators. The total height of the engine is only 11 inches.

At the Road Show in Cleveland, the Lauson Co. is also displaying other models of Lauson vertical air-cooled engines in 1, 2 and 3-hp sizes; vertical radiator-cooled models in 2, 4 and 5-hp sizes as well as horizontal units, and the new 1/2-hp engine described above.

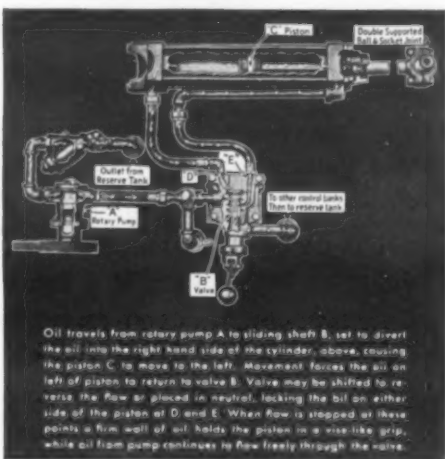
CONTROLS..

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● Four years ago Austin-Western announced its first hydraulically controlled motor grader.

Experience has now proved what tests then indicated, namely: Hydraulic Controls Are the Most Effective Means of Power Control Known to This Industry.

Hydraulic controls are fast. There is not, nor can there be, any lost motion. Control is 100% positive; with the valve closed the ram is locked as in a vise. They have tremendous power to handle any operation easily. They are foolproof. They operate successfully under every



condition of weather or temperature. They are cheaper to operate, and cost less for repairs.

Austin-Western offers the most complete line of road building and earth moving equipment built by any one manufacturer. Thus the Austin-Western sales staff is free to recommend the machine best suited for the job.

Each piece of equipment has more than fifty years of Austin-Western experience back of it. Today, with hydraulic controls adding a plus value to nearly every machine in the line, this added

feature clinches the Austin-Western title to leadership in the roadmachinery industry.

The Austin-Western Road Machinery Co.

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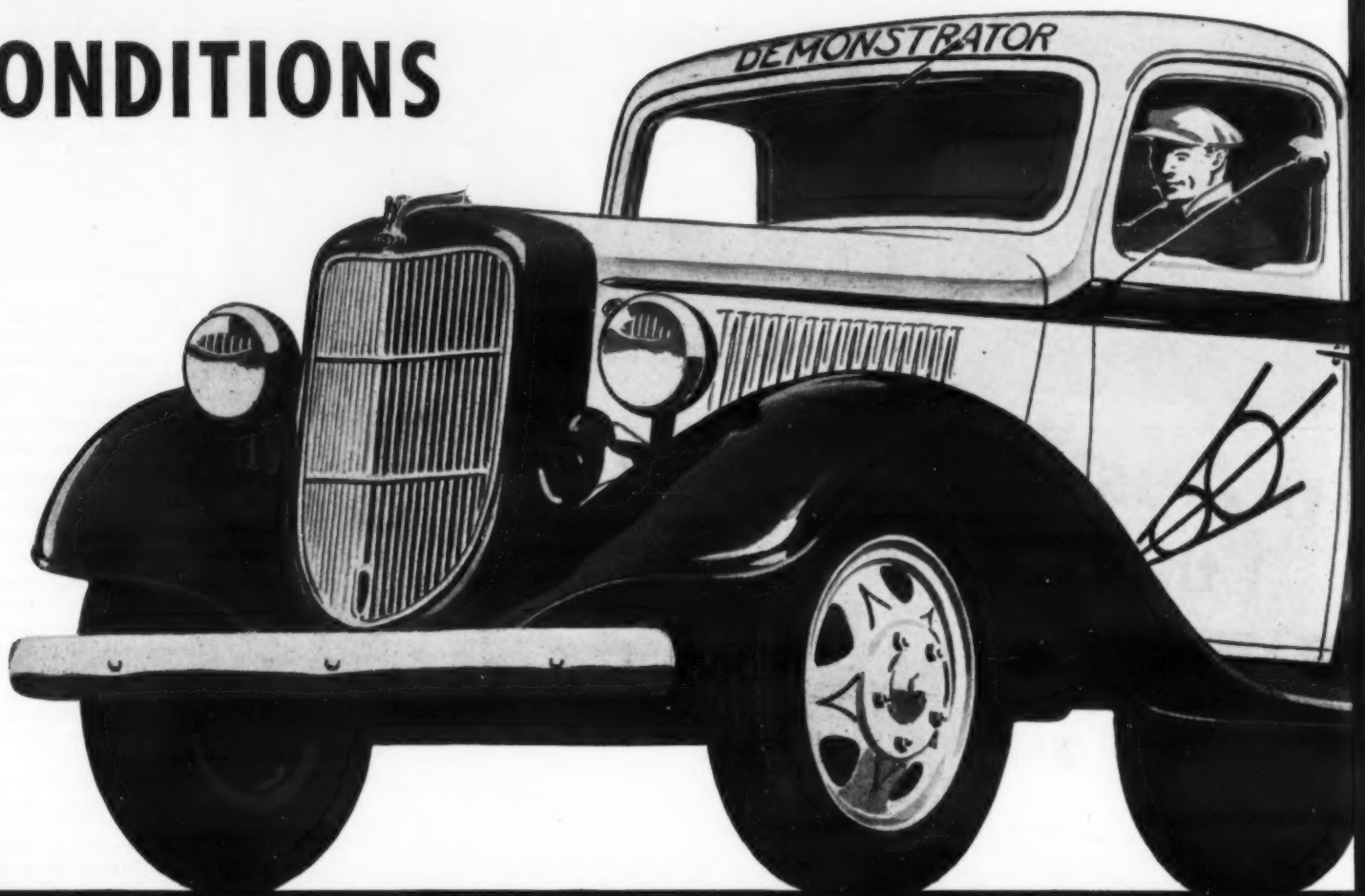
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THERE are no experiments in the 1936 Ford V-8 Trucks and Commercial Cars. Every feature has been PROVED and APPROVED by millions of miles of service under every conceivable condition of load and road and weather. Its 80-horsepower V-8 engine has proved its economy and reliability on the world's greatest proving ground . . . the job itself. Its full-floating rear axle with straddle-mounted pinion . . . full torque-tube drive . . . positive, quick-action safety brakes . . . and many other quality features have proved the soundness of Ford design by their performance in actual service.

This impressive record offers convincing proof of V-8 Reliability. The cost records of owners firmly establish V-8 Economy. And V-8 Performance needs no confirmation, for it is evident everywhere you look. Thus, Ford V-8 Trucks and Commercial Cars have been PROVED BY THE PAST. Now they have been IMPROVED FOR THE FUTURE.

Your Ford dealer invites you to make your own "on-the-job" test without cost or obligation. He will be glad to tell you the details of the money-saving Ford engine-exchange plan. Call him today and set a date.

Convenient Universal Credit Company terms make this great truck value immediately available

FORD V-8

TRUCKS AND COMMERCIAL CARS

Census of Construction To Cover 1935 Operations

The nation-wide Census of Construction which has been made a part of the Census of Business started January 2 and covers 1935 operations. The first Census of Construction was made in 1929 and has been widely used in connection with the problems of the construction industry.

George J. Lawrence, Chief, Construction Division, Census of Business, with headquarters at 2401 Chestnut St., Philadelphia, Pa., states that figures will be secured for the number of persons employed by contractors, man-hours of work in 1935, disbursements for salaries and wages, value of contracts and orders received during 1935, value of construction work performed, and expenditures for materials. In addition, information is to be obtained for the location of business establishments that are regularly maintained by contractors, the legal form of the organization, whether firm or corporation, and the kind of construction business in which they were engaged during 1935.

Particular emphasis is laid on the fact that the Bureau of the Census is keeping confidential all of the information collected in this Census of Construction. Only sworn employees of the Bureau of the Census are permitted to examine the individual returns. No access to them is permitted under the law, not even to other Governmental agencies, and no information will be disclosed which would reveal any of the facts or figures in the individual returns, according to F. A. Gosnell, Chief Statistician, Census of Business. All data collected will be combined and presented as statistical summaries for each city, county and state where such presentation can be made without disclosing the identity of the individual operations. It is expected that preliminary but essentially complete reports by states will be released beginning about July 1, 1936, followed by county and city reports in final form and kind-of-business reports.

Caissons Now Bore Their Way

The most recent development in the sinking of caissons for building foundations is the use of large steel cylinders up to 8 feet in diameter, with saw teeth cut in one end, rotated so that they cut their way through earth, shale, and rock. The teeth need but to last during the drilling of approximately 70 feet of earth and rock, but it has been found that satisfactory results are possible only when the teeth were protected by a welded-on covering containing crushed tungsten carbide evenly distributed in the steel binder.

A novel discovery in connection with this caisson work was that muddy water, used to wash the earth from the inside of the rotating caisson, lubricates the cutting edge of the cylinder and gives more satisfactory results than does clear water. The recirculation of the muddy water is hard on the bearings of the centrifugal jet pump. Hard-facing the bearings with Haynes Stellite and grinding them to fit has increased the pump life from 4 to 40 caissons before repairs are required. This method has shortened the usual time of sinking caissons from approximately eight days to a matter of hours.

The welding rod used for coating the saw teeth of the caisson is Tube Haystellite and consists of a steel tube the center of which is filled with crushed tungsten carbide. During the welding operation, the hard, wear-resistant, crushed Haystellite is bound to the surface to be covered by the steel of the tube. This new hard-facing rod of the Haynes Stellite Co., 205 E. 42nd St., New York City, is used primarily for

the coating of oil well bits but its use has been expanded to the excavating, dredging and mining industries.

New Series of Diesels

As another step in its program to offer a complete line of high-speed 6-cylinder diesel engines paralleling in performance and installation dimensions similar displacement Hercules gasoline engines, the Hercules Motors Corp., Canton, Ohio, has recently announced the new series DJX diesels.

Both models in this series are 6-cylinder, the smallest, DJXB, having a 3 1/2-inch bore and 4 1/2-inch stroke and a 260-cubic inch displacement, while the DJXC has a bore of 3 11/16 inches, a 4 1/2-inch stroke and a 288-cubic inch displacement. The DJXB is rated at 79 hp and the DJXC at 82.5 hp at 2,600 rpm.

This series is available in power unit form, either fully enclosed or in the open type of assembly.

Austin-Western Agency In Illinois and Indiana

The Austin-Western Road Machinery Co., Aurora, Ill., has announced the appointment of S. F. Beatty, Jr., as Sales Manager for the Illinois and Indiana territories. It has also announced that the Austin-Western Agency, Inc., 111 W. Washington St., Chicago, Ill., will

handle sales of Austin-Western equipment in Lake, Cook, DuPage, Will and Kankakee Counties in Illinois and Lake and Porter Counties in Indiana. The officers of this Agency are: President, J. Frank Peaslee; Vice President, Edwin J. McGinty; and Treasurer, Herbert B. Cadmus. All three officers have been connected with the Austin-Western Road Machinery Co. for from eight to eleven years.

"PROSPEROUS NEW YEAR"

THE FLEXIBLE ROAD JOINT MACHINE COMPANY wishes its friends A Happy and Prosperous New Year.

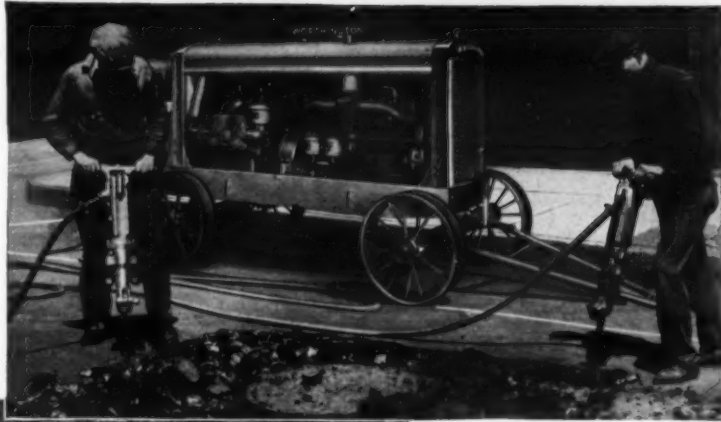
See Us at Road Show—Booth E-11

Because of the merit of our product and our policy never to take unfair advantage in any situation, our sales have steadily increased even through the depression.

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Preparing Soil Layers for Stabilized Roads

Where the soil in the existing surface or shoulders of an earth road which is to be stabilized does not meet the requirements for stability, the deficiency should be corrected by the proper admixture. There are three methods used in the construction of graded soil layers; plant-mix, road-mix, and stage construction, according to a paper, "Stabilized Soil Roads" by C. A. Hogentogler and E. A. Willis, Senior Highway Engineer and Assistant Highway Engineer, respectively, U. S. Bureau of Public Roads. The essential features of a plant-mix job are a source of satisfactory binder close to the supply of coarse aggregate, means for drying and pulverizing the binder, apparatus for measuring the quantities of binder and aggregate to secure the proper proportions, and equipment for thoroughly mixing the combined materials—either a pug mill or rotary type mixer.

An ideal location for a mixing plant is one where the overburden consists of a clay soil possessing properties satisfactory for binder purposes. This overburden may be stripped and stockpiled in windrows so that it will dry sufficiently to be pulverized under a roller. The clay should then be placed in a bin and combined with an aggregate of proper grading in such proportions that the resulting mixture will conform with the desired specifications. In some instances plant mixes have utilized bank-run gravel with the existing overburden and have eliminated the drying and pulverizing steps by passing the combined materials through a rotary screen which removes all over-sized material.

The mixture as it comes from the plant is hauled to the road, spread, sprinkled, shaped, and rolled. The principal advantages of the plant-mix method are greater uniformity and more thorough mixing of the binder and aggregate.

The necessary equipment for mixing on the road includes tractor-drawn or self-propelled bladers, supplemented by scarifiers and apparatus for mixing, moistening, spreading, and compacting.

The existing surface should be scarified just deep enough to eliminate all irregularities and permit reshaping and adjustment to grade. After the loosened material is trued up, the entire surface should again be scarified so that if the loosened material were bladed away, a true base surface parallel to the newly conditioned surface would result.

New material, if required, should then be spread in sufficient amount to furnish a compacted layer of 3 inches. Where greater surface thickness is desired, additional layers should be constructed.

The "cut-and-try" method of road construction has been used extensively in the so-called "stage construction" and "traffic-bound" roads. Essentially it consists of adding granular materials to surfaces which become excessively muddy during wet weather and adding clay soil to loose sandy and gravelly materials.

During the period of compaction, the loose material should be kept distributed over the road surface by means of a road drag or blader. For this purpose, a crown of about $\frac{3}{4}$ -inch per foot should be maintained. Pitting of the surface indicates that the crown is too slight.

(From Civil Engineering for December, 1935, page 759)

New Two-Speed-Axle Trucks

Two-speed axle construction providing eight forward and two reverse speeds features three new motor truck models announced by International Harvester Co., Chicago, Ill. With these two-speed rear axle models, a truck owner has both speed and power available in one unit. The low-gear axle ratio enables heavy loads to be hauled up steep hills and over rough roads, while the high-gear axle ratio allows high speeds on level roads or with light loads. A simple movement of the shifting lever and the driver changes to either low-speed or high-speed operation instantly and silently without stopping the truck. This two-



C. & E. M. Photo

A Study in Tires. The Two Fronts Are Goodyear All-Weather Tires, the Rear Left Is a Goodyear 16-Ply 18.0x6 and the Rear Right Is a Firestone 17.25-24

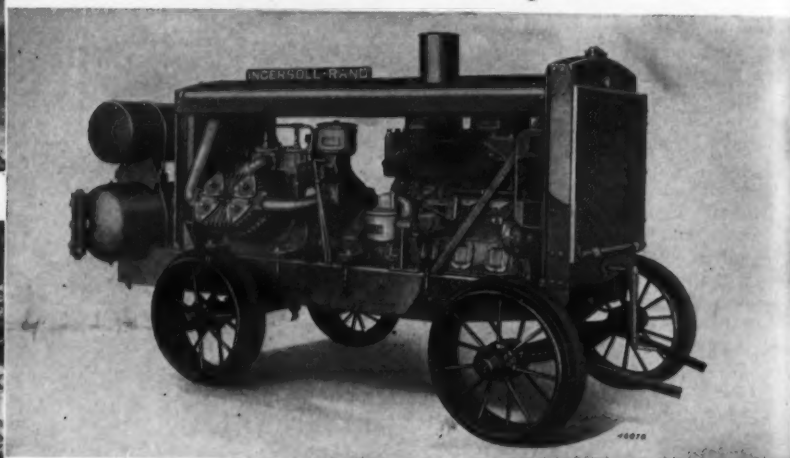
speed rear axle is available with a high-speed ratio of 5.14 to 1 and a low-speed ratio of 7.15 to 1.

Model CS-30 is available in 133 and 157-inch wheelbases, Model CS-35 in

136, 160 and 175-inch wheelbases, and the six-wheeler Model CS-35-T in 168 and 180-inch wheelbases. All of these models are powered by 6-cylinder International Harvester engines.



Service Record tells the story of



Two-Stage, Air-Cooled Portable Compressors

Three years ago when I-R pioneered in the field of Air-Cooled portable compressors, we claimed that these machines would deliver more air, use less fuel and give more dependable service. These machines were then the result of six separate designs that had been built and tested during the previous two years, all based on our 67 years of compressor building experience.

Today experienced contractors know what I-R two-stage, air-cooled machines will do. They know, or can quickly ascertain the facts, from actual results in the field on a wide variety of construction jobs, a few of which are pictured here. The actual opinion of users is available for check-up—and it's what the user says that counts.

The salient features of these compressors are given below. The results of these features, in actual service over a three-year period, have proved I-R Two-Stage Air-Cooled Portable Compressors to be an economical, efficient and dependable source of air power under all conditions of service. Five sizes—all recognized styles of mountings.

Salient Features

Two-stage, air cooled compressor.

Increased efficiency at altitudes and in hot climates.

The gasoline engine driven units use 25% less fuel. The oil engine driven units enable saving up to 65% in fuel cost per foot of air delivered.

Delivers 23% more air at 100-pounds pressure than the best single-stage compressor of the same piston displacement.

Lower temperatures.

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Forms for Deck of Steel Bridge

(Continued from page 2)

at 14 days. Using sand and gravel from the Chillicothe plant of the McGrath Sand & Gravel Co., it was found necessary to use 210 pounds of sand and 354 pounds of gravel with 5.44 gallons of water per sack of cement, which yielded 4.62 cubic feet of concrete. This produced a very plastic and workable mix, with a slump of from 1 to 1½ inches, and a modulus of rupture averaging 890 pounds per square inch at 14 days. That appears to be a very dry mix for a 7-inch slab containing so much reinforcing steel; however, by using a mechanical vibrator and with careful spading, the concrete was dense and had no honeycomb on the under side. Three 6 x 6 x 30-inch test beams were cast each day that concrete was poured; one beam to be broken at 4 days, another at 7 days, and the third at 14 days.

The aggregate were trucked to the job direct from the plant 17 miles away, storing only enough on the finished slab for about two hours' run. With two men wheeling sand, and four men wheeling gravel in wheelbarrows to the skip, the new 10-S Leach mixer was kept busy. The aggregates were weighed on two double-beam platform scales, one for each material. The cement was stored on a platform beside the mixer; one man was kept busy emptying cement in the skip and bundling empty sacks.

The mixer with an extension skip was mounted on a platform high enough to discharge into a hopper holding the two-bag batch. An average of six two-wheel concrete buggies was used to transport the concrete over a plank runway to the forms at the rate of 10 to 12 cubic yards per hour. Here five men puddled the concrete and operated the strike-off. After the concrete was placed and vibrated, a heavy wood strike-off screed operated on tracks made of 2 x 4's placed on small 2 x 4 blocks just 7 inches high was pulled and rocked over the surface twice, giving the concrete a relative smooth and dense surface with the specified 1⅝-inch crown. After the screeding, the 2 x 4 tracks were removed and two finishers, working from bridges hung on the hand-rails, floated the slab with a 14-foot longitudinal float, lapping 7 feet each time they moved ahead. That operation filled all low spots, and floated down high places. Usually two trips over was sufficient. The surface was then checked with a 10-foot straight-edge.

After the surface gloss had dried off it was belted, usually about 25 feet behind the longitudinal float. When the concrete had started to set up, it was broomed with a short-handled 24-inch bassine fiber broom, operated from another bridge, for it was found to be impossible to manipulate a long-handled broom from the side. Immediately after brooming, the surface was covered with wet burlap. Two men did the belting, brooming and covering with burlap. The concrete was cured by keeping the burlap wet until the floor was opened for contractor's traffic in about 7 days. The contractor was permitted to remove the forms when the concrete had a modulus of rupture of 500 pounds per square inch; on an average it was on the fourth day.

A scaffold the width of the bridge and about 30 feet long was hung from the lower chords, so that a gang of eight men could strip the forms and clean the steel of a 200-foot span in two 8-hour days. The forms came away easily and with very little work on them, they were ready to be placed on the next section. The curb forms were set in place before

the bottom forms could be removed. That furnished work for the carpenters while the floor was curing. The curb was poured as soon as the bottom forms were removed, and was given its first bricking the next day.

The contract for the erection of the steel and laying the floor was awarded to the McClintic-Marshall Corp., for \$58,284.86. They subcontracted the floor to Stresenreuter Bros., who completed the work June 20, 1935.

Skilled labor was secured from the local unions, and all common labor came from the local employment agent. Henry Stresenreuter was in charge as Superintendent for the contractor. J. E. Raffensperger was Resident Engineer for the State Highway Department of Illinois.

During July over 405,000 people were working at the site of PWA construction projects. Although this was a decrease of 9,000 from the level of the previous month, employment in July was the highest for any month of 1935 except June.

A 2-Ton Utility Roller for Light Road Work

The C. H. & E. 2-ton tandem roller, recently announced by the C. H. & E. Mfg. Co., 120 E. Mineral St., Milwaukee, Wis., is designed for all types of light rolling work, including highway shoulders, bituminous road patching, sidewalks and similar work. It is a small and compact unit for easy handling in narrow and restricted places which are inaccessible to large rollers and will operate between street car tracks and close up to curbs.

The roller is simple and sturdy in construction. Operation is similar to that of an automobile, with automotive steering mechanism, foot brake pedal and foot throttle control of the engine. It has one speed forward and one reverse.

The weight of the unit is 3,000 pounds with the rear roller empty, or 4,000 pounds with the rear roller filled with water. The front roller is 24 inches wide and 24 inches in diameter,



The New C. H. & E. 2-Ton Utility Roller

and the rear roller, 34 inches wide and 36 inches in diameter. The overall length is 7 feet 8 inches and the width 3 feet 9 inches. Power is furnished by a LeRoi 4-cylinder radiator-cooled engine or a Wisconsin 4-cylinder air-cooled engine.

YOU CAN GET THE

SHOW-DOWN

EVERYWHERE

Working day and night, this "Caterpillar" Diesel Tractor cuts the costs and speeds up the work of building a dam near Beach City, Ohio.

Wherever there's dirt to be moved—or any one of a hundred other jobs to be done—there's where you'll learn the "Caterpillar" SHOW-DOWN. You'll see "Caterpillar" Tractors, the 3-to-1 preference on the country's biggest construction jobs. You'll hear talk of the new records for low costs that are being made by "Caterpillar" Diesels. And you'll get the rest of the SHOW-DOWN—the proof of low maintenance costs—from owners who have run their "Caterpillar" Diesels 6000, 8000 hours and more. See your dealer for details of this modern power. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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D I E S E L

Costs of Chlorides for Stabilization

(Continued from page 2)

ered "stage construction" as the present surfacing will serve as a base for a more substantial surface, when traffic demands. The soil or sand-clay used has a clay content of from 9 to 15 per cent with aggregate ranging up to 1/2-inch in size. The surface was built in 1934.

Two sections, each 3.65 miles in length, were selected for stabilization with calcium chloride and salt respectively. On both sections the road was scarified lightly in order that it might be reshaped to a cross-section having a crown of approximately 1/2-inch to the foot. The road, being dry, was sprinkled to aid traffic in the rebonding process.

Calcium Chloride Application

After the surface was well compacted it was again sprinkled lightly and flake calcium chloride was applied with a lime spreader at the rate of approximately 2.1 pounds to the square yard. At the end of about 24 hours the crystals had disappeared and the surface presented a dark, damp appearance. Several days later, after a light rain, the surface was lightly bladed, working from the sides toward the center.

Equipment used on this project was as follows:

- 1 crawler-type 50 tractor
- 1 12-foot blade grader with scarifier
- 1 8-foot one-man grader
- 3 1 1/2-ton trucks
- 1 3-inch water pump
- 1 500-gallon sprinkler tank
- 1 lime spreader

Cost of scarifying, reshaping, bonding and applying calcium chloride was as follows:

Equipment rentals (state equipment)	\$ 140.25
Wages—common labor (30¢ per hour)	\$4.90
Equipment rentals (hired trucks and lime spreader)	129.70
Salaries (foremen and operators)	106.25
Calcium chloride (45 tons @ \$23.50 ton)	1,057.50

Total Cost (3.65 miles 20-foot road).....\$1,518.60

Cost per mile.....\$416.06

Cost per square yard.....\$0.0354

Salt Stabilization

To the compacted surface rock salt, CC Grade (1/4-inch down), was applied with a lime spreader at the rate of 2.6 pounds to the square yard. The road was then scarified to a depth of about 3 inches and bladed into windrows to the sides and then bladed back to insure thorough mixing. As the mixture was bladed back it was sprinkled to afford water for dissolving the salt. During the reshaping with the blade the sprinkling was continued. This was quite necessary because, when the sprinkling was discontinued, the salt-impregnated soil set very quickly and within a few hours was too hard to permit further blading. Approximately 15,000 gallons of water to the mile was used.

Equipment used was practically the same as was used on the calcium chloride section. This equipment, with the exception of a Fordson tractor and planer, which were used for 8 1/2 hours only, was used for a total of 31 hours on September 26 to 30, inclusive.

Cost figures on this work are as follows:

Equipment rentals (state equipment)	\$ 117.75
Hired trucks	200.00
Lime spreader—31 hours @ 10¢	3.10
Salaries (foremen and operators)	89.64
Wages (labor @ 30¢ per hour)	60.90
Salt (60 tons @ \$8.60 ton)	516.00
Miscellaneous	25.00

Total cost (3.65 miles 20-foot road).....\$1,011.39

Cost per mile.....\$277.09

Cost per square yard.....\$0.0236

Rolling and Maintenance

Due to the fact that the aggregate was rather small, in the sand-clay material on the road, a roller was not used on either of the sections. However, this is very necessary when the coarse aggregate is larger, as has been found from previous experiences on other work done in Virginia. The roller pushes the larger particles down, leaving the

finer on top as a wearing surface. Coarse particles on the surface work loose and act as an abrasive to the surface of the road. In the opinion of the writer proper maintenance methods must be developed to remove coarse particles as the road wears under traffic. A slow moving rotary broom is suggested for this purpose.

Stabilization has apparently proved a success on this road. It is believed that a more permanent stabilization can be obtained by using a surfacing material containing a larger percentage of material up to 3/4 inch.

Three of New Excavators Equal Ninety Canal Monsters

Three of the new Bucyrus-Erie 950-B power shovels, one of which was recently placed in operation near Terre Haute, Ind., equal in speed and capacity ninety of the then-largest excavators used to dig the "big ditch" across the Isthmus of Panama. Or, compared with a present-day popular 3/8-yard 10-B, the 950-B

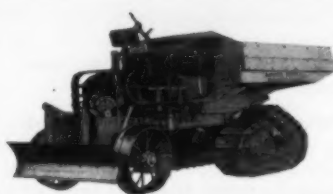
has actually eighty times the dipper capacity of this smallest shovel in the Bucyrus-Erie line.

In operation, the huge 30-yard dipper lifts 45 tons of dirt and rock at each pass, to be dumped farther and higher than any other shovel in the world has ever been able to dump, according to the manufacturer's statement. The mammoth machine has a boom 105 feet long, a dipper stick 64 feet long, a maximum dumping height of 70 feet, a cutting

radius of 115 feet, and a dumping radius of 106 feet.

The operator of the machine sits in his control cab at the height of a 3-story building. At his fingertips are the controls for thirty-two different electric motors used in the various operations of moving, leveling, digging, and dumping. These motors range in size from 1/8 hp to one of 1,000 hp which drives four main generators. This shovel has been developed for open-pit mining.

ESTABLISHED 1854



The CAMEL TRACTOR DUMP WAGON

Combines in One Versatile Heavy Duty Unit Features of Truck, Tractor, Trailer and Bulldozer. Goes where Trucks cannot. Handles easily in limited space, forward or backward. Four to five cubic yards capacity. Rough ground or soft spots are no obstacles. Increases capacity of power shovels or elevating graders.

Send for descriptive circulars Dept. 36

SHUNK MANUFACTURING COMPANY, Bucyrus, Ohio, U. S. A.

The largest manufacturer of Road Grader Blades in the world



(Above) On the job with an Alemite Volume Gun, designed to deliver a large volume of lubricant quickly to large-cavity bearings. Lubricant delivery is 1 1/5 oz. per stroke of the handle. Lubricants handled: Regular, Fluid, and Viscous. Excellent for tractor track rolls.



(Below) Lubricating on the job with an Alemite Gun equipped with Ball-Jointed Hose. Extremely high pressures can be developed by pumping the lever handle. You know the lubricant is being forced into the bearing. And when you use Alemite Lubricants you know your equipment is protected against friction and wrenching strains.

DON'T WORRY ABOUT MUD and CLAY!

Alemite Provides Positive Pressure—Insures Thorough Lubrication

When you lubricate your equipment, do you know each bearing receives the lubricant it really must have? And when your machines are caked with dirt, do you know the lubricant reaches those unseen shafts and moving parts?

End your worries with Alemite! For no matter what conditions you have to put up with, Alemite Systems provide exactly the lubricant pressure required to keep

your equipment fully protected from destructive friction. And no matter what kind of work you're doing—no matter what type of machinery you use, there's a low-cost Alemite way to insure thorough lubrication.

And Alemite has developed a complete line of extreme-pressure lubricants—lubricants that withstand terrific strains and loads, and keep your equipment on the job week in and week out.

Alemite Saves You Money

Whether you lubricate your machinery on the job or in the shop, you'll save time, labor and lubricant with Alemite Equipment and Alemite Temprite Lubricants. And best of all—you'll know your equipment is protected against friction!

New Free Handbook

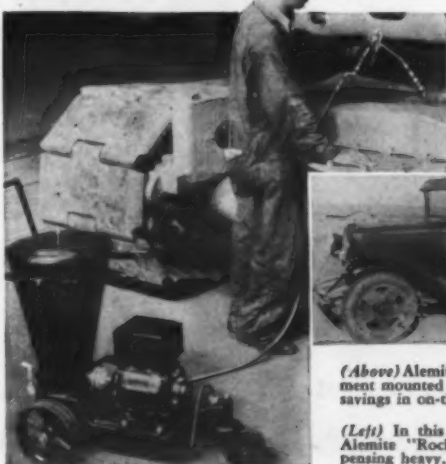
Let us send you our newest handbook—"The Case of Alemite vs. Friction." It's free!

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IN THE SHOP AND



ON THE JOB

(Above) Alemite Powergun Lubrication Equipment mounted on a truck. It brings amazing savings in on-the-job lubrication.

(Left) In this shop an Electrically-Operated Alemite "Rock Crusher" Powergun is dispensing heavy, fibrous lubricant.

Advertisement

Cable Control Combines Speed With Power

LE TOURNEAU POWER UNIT Has High Working Efficiency; Cold or Heat Does Not Affect It

KENNETH F. PARK
Engineer, R. G. Le Tourneau, Inc.

CONTROL of earthmoving equipment has always been the limiting factor in the handling of big yardages. Usually where speed has been necessary, power has been sacrificed—if power has been the dominant necessity, speed has been so reduced as to greatly lessen top efficiency and, consequently, output.

With the development of the LE TOURNEAU mechanical control, the

line of from 3,675 pounds to more than 6,000 pounds. As a result, BULLDOZER and ANGLEDZER blades can be raised rapidly at speeds ranging from 1.2 to 2.3 vertical feet per second with lifts respectively of 31,438 and 10,921 pounds.

Stout-Simple Construction

The LE TOURNEAU POWER UNIT is made entirely of special alloy steels, electrically welded and forged. All parts subjected to excessive wear or strain are case hardened or heat treated for toughness. Heavy-duty Timken and Hyatt bearings are used throughout to reduce strain and wear. Non-essentials have been eliminated. There are no leaky valve fittings to cause loss of

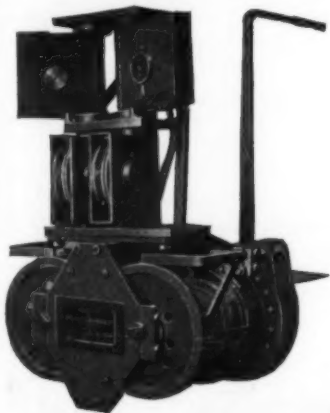
pressure, no hose or pistons to freeze up or slow up operations in cold weather, no thinning of oils or by-passing to delay high-pressure work, no pistons to limit the high lift and low drop of cutting blades or aprons, no heavy motors costing in many cases more to operate than the Diesel tractor itself.

Power Unit Has Many Uses

The LE TOURNEAU POWER CONTROL UNIT is not limited to the operation of one machine. It will operate all types of LE TOURNEAU equipment by simply disconnecting the tractor from one machine and hooking on to another, or such combinations of equipment as BULLDOZER and ROOTER can be operated from one POWER CONTROL UNIT without disconnecting either from the tractor. In addition to the operation of equipment, lines from the POWER CONTROL UNIT can be used for clearing stumps or rocks, pulling stalled equipment out of mud holes, etc. In action it is powerful, positive, accurate and trigger-quick.

Advertisement

For the latest ideas in earthmoving, visit the LE TOURNEAU display, booth B-12, at the Cleveland Road Show, January 20 to 24.



much-to-be-desired requisites of speed and power have been combined and that without sacrificing simplicity. This development was the natural result of a long search for a faster and cheaper way of handling earth and rock. The designer of the LE TOURNEAU POWER CONTROL UNIT, R. G. Le Tourneau, tried such methods of control as hydraulic, electric and other auxiliary motors. He discarded them all as too slow, too complicated and too limited in power delivery. He adopted mechanical cable control only after extensive use on his own construction jobs had proved it definitely a faster and better method of control for operating equipment.

Easy to Operate

The LE TOURNEAU POWER CONTROL UNIT derives its power from the tractor's gears through a simple but specially-built spline shaft. The mechanism runs free as long as the tractor clutch is in. Control is by lever conveniently placed so the tractor operator may observe both the tool and the road ahead. This lever operates easily and positively—finger-tip pressure will move it. With the control lever in the neutral position the cable drum is locked by a band brake. Moving the lever one way engages the clutch and winds in the cable; moving it the other way allows the drum to spin freely and unwind. This winding and unwinding of cables through the POWER UNIT is what controls and operates the various LE TOURNEAU tools. LE TOURNEAU power equipment can be operated either while the tractor and equipment are in motion or standing still.

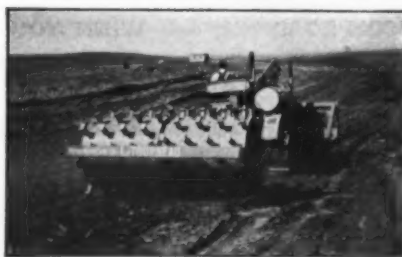
The LE TOURNEAU POWER CONTROL UNIT derives its power directly from the tractor gears, and is capable of transmitting 60 HP with an efficiency of 90%, several times that of most other methods of control. This working efficiency makes available cable speeds ranging from 328 to more than 500 feet per minute and a line pull on a single



FOR LOW COST YARDAGE



BULLDOZER



SHEEP'S FOOT ROLLER

CARRYALL SCRAPERS to operate with 40 to 95 HP tractors, for cut and fill work, excavating, grading, finishing, land-leveling and dam building.

BULLDOZERS and ANGLEDZERS with correctly-curved bowl, built to dig, making down pressure unnecessary; with fast, high, powerful lift and low drop; of light, yet stout and rigid construction. ANGLEDZERS with simple angling adjustment—rigid in all positions.

ROOTERS to break up the toughest of materials. Two sizes—Type "S" with 20" maximum penetration, and Heavy-Duty with 28". Both sizes will stand the full pull of the largest tractors.

SHEEP'S FOOT ROLLERS built to meet exacting Government and State specifications, for compacting highways, reservoirs, dams and embankments.

Our Engineering Department will gladly consult with you regarding your earthmoving problems. Write:

R. G. LE TOURNEAU, Inc.
Peoria, Ill. Stockton, Calif.
Cable Address: "Bobletorno"



ROOTER



ANGLEDZER

LETOURNEAU

Preparing the Rock for Unusual Sea Wall

New Type of Breakwater in Port of Los Angeles, Calif., Presents Special Problems in Blasting

A NEW type of breakwater, which will provide the largest and perhaps the most ideal man-made seaport in the world, now being constructed for the port of Los Angeles, Calif., by the Rohl-Connolly Co., of San Francisco, Calif., for the Federal Government at a cost of \$7,000,000, is described in a recent issue of *The Explosives Engineer*.

The uniqueness of this breakwater lies in the fact that it will have a sand and clay core protected by a thick layer of Class B stone capped in turn with a heavy layer of enormous Class A granite. This type of construction has resulted in a reduction in cost of more than 50 per cent as compared with a seawall of solid stone.

Preparing the Big Stone

The old breakwater was constructed of granite from Santa Catalina Island, which is entirely satisfactory for both under-water and above-water construction but has one serious disadvantage. Its jointing is irregular and it cannot be blasted out in pieces large enough for breakwater caprock without serious waste. Consequently it was necessary for the contractor to look about for a more satisfactory quarry location. An inactive granite quarry 5 miles west of Riverside was finally reopened. A spur track from the Union Pacific was built into the quarry and machinery moved in.

Two Bucyrus-Erie well drills are used to sink the 8-inch holes behind the steep quarry face and two Armstrong Leyners are used for drilling the 3-inch snake holes. A battery of five Ingersoll-Rand S-49 jack hammers serves for the block-holing. At present the quarry employs two well-drill runners, two Leyner men and two block hole men.

The well and Leyner drills are used in primary breaking operations while the secondary breaking, which is of more than usual importance, is done by blockholing. The well drill holes are 8 inches in diameter and are sunk 10 feet below the elevation of the quarry floor. These holes average about 160 feet in depth. Usually only a single row of holes, 10 to 12 in number, is fired at a time. The holes are spaced approximately 25 feet apart, and 50 feet back from the quarry face.

The well holes are sprung with 80 per cent gelatin, until a chamber is obtained that is capable of holding the required charge of free-running low-grade ammonia dynamite used for the main blast. The holes are loaded to a point about 25 feet above the quarry floor, using deck loading if necessary and the explosive detonated with Cordeau fuse, an electric blasting cap and a blasting machine.

Leyner drill holes are used to break down smaller amounts of stone at desired points along the face of the quarry. These 3-inch holes are drilled 30 to 35 feet deep, usually obliquely upward, and are chambered at the bottom to receive 250 to 300 pounds of the same explosive used in the well drill holes. Cordeau detonating fuse is likewise used in firing these shots, which bring down 15,000 to 20,000 tons of rock at a time.

Both gelatin and bag powder are used in blockholing. Frank Wilson, the powderman, prefers to use the free-running dynamite for this purpose whenever feasible.

Loading the Stone

Two 480 Marion electric cranes han-

dle the huge boulders at the quarry. One, a crawler-mounted unit, loads the rock onto the trucks and the other, a stationary unit, transfers the rock from truck to railroad flat car. Two Sterling 6-cylinder trucks transport the rock from the quarry to the railroad siding.

At the dock a monster shore crane lifts the stone from the flat cars to the barges. The weight of each stone is painted upon it with quick-drying paint as it leaves the quarry, greatly simplifying the work of loading the barges. A weight tally is kept and when 1,000 tons has been loaded onto the barge, a tug tows the barge out to the seawall. Alongside the breakwater is a barge-mounted Bucyrus-Erie 24 steam crane, a piece of equipment with 30 years service behind it. This swings the huge rocks into place.

Personnel

The contractor for this project is Rohl-Connolly Co., Tom Connolly, President, and Tom Rohl, Vice President, both veterans in the field of en-

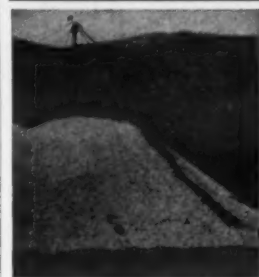
gineering construction. M. R. Ward is Superintendent of operations at the harbor and O. C. Steves, Superintendent at the quarry.

New Rex Dealer for So. Dak.

Chain Belt Co., Milwaukee, Wis., has announced the appointment of Western Material Co., Sioux Falls, S. D., as ex-

clusive distributor of the following Rex products: 3½-S to 84-S building mixers, 27-E pavers, plaster and mortar mixers, saw rigs, cold-patch mixers, Speed Prime and diaphragm pumps, and the Pump-crete.

The Western Material Co. was established in 1922 and during the past thirteen years has been serving contractors in the South Dakota territory. E. K. Hurst is President of the company.



Sauerman Slacklines dumping sand and boulders on pile.

Low Cost Excavating

When you have a contract that requires moving dirt several hundred feet or more, isn't it logical to use a machine that will reach the entire distance and eliminate rehandling?

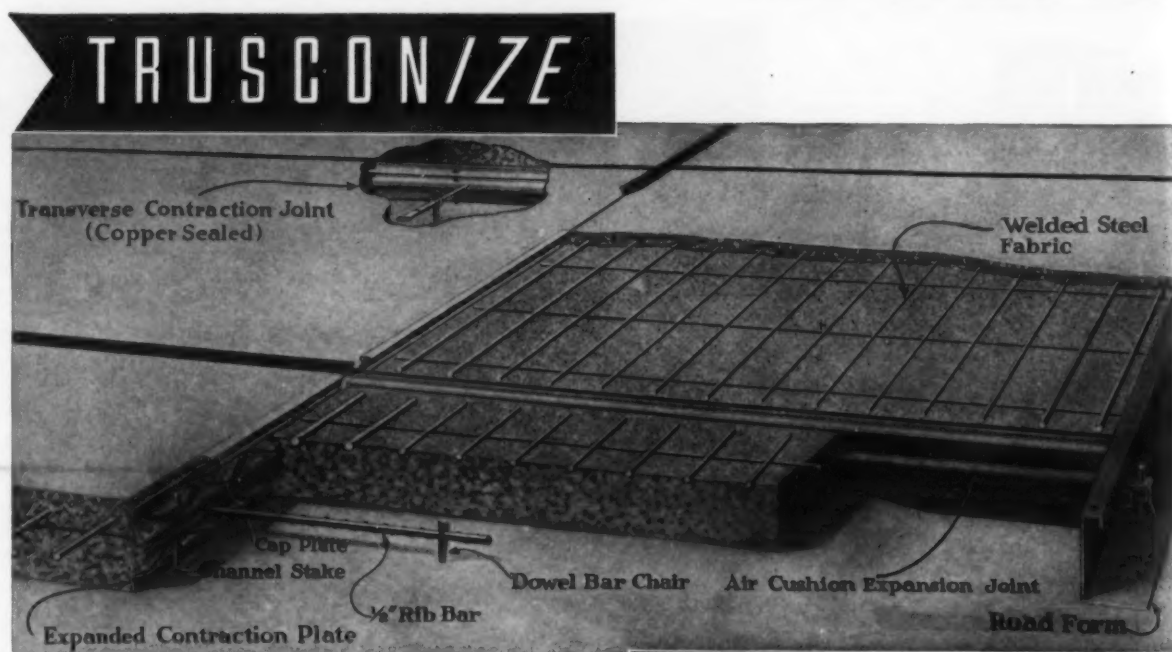
Sauerman Slacklines and Drag Scrapers will do just that—reach from 100 to 1500 ft. and handle the digging, hauling and placing of the dirt in one operation.

Write for new Catalog

SAUERMAN BROS.
464 S. Clinton St., Chicago



Small Saueyman Scraper making a highway cut-and-fill.



The Truscon Line of steel highway products is complete.

HIGHWAYS

TRUSCONIZE means Modernize! Safety, permanence and true economy in road construction, *plus* protection of taxpayers' money, are assured when you TRUSCONIZE highways. Engineers, contractors, road commissioners and taxpayers benefit when highways are TRUSCONIZED. Twenty-five years of experience and an unchallenged leadership stand back of all Truscon Products.

OTHER TRUSCON ROAD BUILDING PRODUCTS

Welded Steel Fabric for producing permanent and wear-resisting surfaces. • Steel Expansion Joints and Contraction Plates to relieve stresses in concrete and provide straight, regular cracks. • Rolled Steel Bars for supplemental reinforcing. • Carb Bars, Rib Bars and Edge Protectors.

WHEN YOU VISIT THE NATIONAL ROAD SHOW

Truscon Steel Company invites you to visit its complete display in Booth G-14 at the National Road Show in Cleveland, Ohio, January 20-25, 1936. Old friends will greet you and be glad to acquaint you with the story of Truscon's new accomplishments in the field of modern road construction.

TRUSCON STEEL COMPANY

YOUNGSTOWN, OHIO

County Engr. Discusses Winter Maintenance

(Continued from page 1)

and winds add much dust and dirt, thus forming very hard drifts.

The trunk line routes, including 175 miles, are maintained by the State Highway Department. The county is responsible for the County Aid and State Aid roads, involving 475 miles, and the remaining 700 miles are maintained by twenty-three townships.

Early Preparations

Much effort is put forth in cutting weeds and brush along the right-of-way in the fall of the year, and then a plentiful supply of snow fence is erected at points where they have experienced drifting troubles on the 475 miles of road maintained by the county.

When Snow Comes

The first snowfalls, if not too severe, are taken care of with six motor patrol graders equipped with V-type snow plows. These patrols are located at various advantageous points in the county and, if necessary, work 24 hours a day, following a storm.

When conditions become more difficult, there are five V-type speed plows which are propelled by two 3½-ton trucks hooked in tandem. The rear truck is equipped with a 10-foot widening wing which, when operated at a speed of 15 to 25 miles an hour, does very effective work, according to Mr. Swift.

If necessary, a large V-type plow propelled by a Sixty crawler-type tractor is put in operation and kept working widening out banks well beyond the road bed in order to permit the speed plows to operate efficiently after the succeeding storms.

Mr. Swift reports that they have found it very profitable to use motor blades to smooth and clean up the road bed after the speed plows have completed their work. By so doing, a very nice driving surface is provided and ice ridges, which cause considerable trouble in thawing spring weather, are prevented.

Equipment Used

The snow removal equipment of the county includes six motor patrol graders, two Caterpillar Auto-Patrols, three Allis-Chalmers Speed Patrols and one Austin-Western; five Wausau V-type speed plows mounted on Mack trucks; a Caterpillar Sixty tractor and a La Plant Choate tractor plow.

Plan of Action

Mankato is the county seat of Blue Earth County and is located in the north central part of the county. All speed plows work out from this point, each plow having a definite route of approximately 95 miles.

Having a definite route assigned to each plow unit, Mr. Swift feels, adds



C. J. Swift, Highway Engineer, Blue Earth County, Mankato, Minn.

to its efficiency inasmuch as its drivers and operators become very familiar with various conditions and they are taught by their experiences how to meet such conditions.

Operators of plows keep in touch with the Engineer's office by telephone from the various towns along their route, so that the Engineer not only knows the progress being made but can give reliable information to the people who have occasion to inquire about the state of the roads.

Know How to Make Repairs to Cast Iron Machinery?

A profusely illustrated booklet has been released by The Linde Air Products Co., 30 E. 42nd St., New York City, containing a consolidation and orderly arrangement of the known facts regarding the repair of damaged cast iron machinery by the oxy-acetylene process. According to the booklet, neither the shape nor size of the casting places any limitation on the use of the oxy-acetylene process for the repair of gray iron, malleable iron, or alloy castings. Bronze-welding, because it is done at a lower temperature, is said as a rule to be more

economical and efficient than the fusion welding of cast iron. Those whose activities involve the use or repair of cast iron machinery will find it well worth their while to obtain a copy of this 8-page illustrated free booklet which is available upon request to readers of CONTRACTORS AND ENGINEERS MONTHLY.

Atlas Equipment Corporation Made Thew-Universal Dealer

The Thew Shovel Co., and The Universal Crane Co., Lorain, Ohio, have announced the appointment of The Atlas Equipment Corp., 1447 Oliver Bldg., Pittsburgh, Pa., as exclusive distributor for Lorain power shovels, cranes and draglines, in capacities of ¾-yard to 2-yard for the western Pennsylvania territory and adjoining portions of West Virginia and Maryland. The principals of the Atlas Equipment Corp. are Paul B. Reinhold, President; J. L. Baird, Vice President; L. B. Cummins, Secretary; and H. A. Ward.

Don't miss the new Continental
TRACTOR EQUIPMENT
Spaces B-8 and B-9
at the Road Show!



THE NEW CONTINENTAL 7 YARD WAGON SCRAPER
it digs—it scoops—it loads—it hauls—it dumps!

It moves more dirt faster!

The new 7 yard Continental Wagon Scraper is the last word in fast, economical dirt moving equipment! It is simple, fool-proof, extremely flexible in operation and ruggedly built to withstand a lot of heavy going.

Continental Wagon Scrapers *Scoop — Dig — Load and Haul.* They can be used to dump over banks or in windrows, for backfilling or stock piling.

No extra labor is needed with Continental Wagon Scrapers. The tractor operator does the work with hydraulically actuated controls conveniently located on the tractor. Operation is quick and maximum maneuverability so essential in close fills on bridges, culverts or walls is fully developed.

Continental Wagon Scrapers are now made in 5 and 7 yard sizes for use with Allis-Chalmers, Caterpillar, Cletrac and McCormick-Deering tractors. A new 9 yard unit will be available soon.

See the 7 yard Scraper in operation at the Road Show, Spaces B-8 and B-9. Get first hand information on the low cost, flexible operation of this faster dirt moving equipment.

Continental RollClear Rippers, a new side mounted Bulldozer and a Trailbuilder will also be displayed. See these equipments when you're there — if you miss them at the Show write for descriptive bulletins.

TRACTOR EQUIPMENT DIVISION
CONTINENTAL ROLL & STEEL FOUNDRY CO.

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CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks. Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

997 West Side Ave. Jersey City, N. J.

How the Other Fellow Did It

Ideas Which Have Already Proved Helpful to Contractors

Why Keep the Old Water Bucket?

374 The old galvanized iron water bucket seems to be a habit in the construction field. Surely there is no sentiment involved, so it must be a matter of custom that dictates that a certain number of these ungainly buckets with metal or enamel-ware dippers sit along the grade or around the cofferdam.

When you come to give it a little thought, the old type of bucket is ungainly, uneconomical because it is so easily tipped and the water slopped out when the none-too-careful water boy is carrying it from the spring or tap to the laborers, and think of the amount of dirt and bugs that get into it while it is in use. The dipper has to hang on the side and trail into the dirt, or else be continually bathed in the water that is to be used for drinking. There is such a thing as sanitation, even on construction projects, and the cleanliness of drinking water is of prime importance.

On two jobs last spring we have seen buckets that seem to fill the bill for ease of transportation, cleanliness at all times and protection of the water from undue contamination. They were simple tin cans about 10 inches in diameter and 3 feet high with a bale for carrying and a cover that slipped easily over the top. The metal dipper hung with a wire on the bale and swung clear of the ground. When the water boy brought the can from the spring he landed at the job with a full pail and not half of it laying the dust along the way. A little care in placing the can prevented tipping.

We did learn from E. J. Callahan, Superintendent for G. G. Herrick, that last year he had some water cans that overcame even this objection. They were about twice as large at the bottom as at the top, had covers and were tall enough to prevent the dipper from coming in contact with the ground.

Spreader Boxes Designed for Safety and Efficiency

375 A Midwestern contractor pointed with pride to a simple device on his spreader boxes which has done away entirely with accidents when the men are hooking or unhooking the boxes from the truck. It was designed by Anthony De Salvo, of the De Salvo Construction Co.

The spreader boxes are 10 feet wide, built of heavy sheet metal with a 6x6-inch angle iron as the front cross member carrying the burden of the blows from trucks and for pulling the box. In the forward leg of the angle two pairs of holes were burned for slipping the connecting chains through, but the device that has eliminated accidents is a pair of slots in the projecting ends of the angle.

In hooking up to a truck the driver

is ordered to stop about 5 feet from the box. Then the spreader box laborers step between the truck and the box and hook the chain to the truck. The chains are always kept running through the hole at either side of the center of the box and the ends carried outside the box. The truck then backs up and with the men standing outside the box they pull in the slack of the chains and drop it through the slots burned in the ends of the angle when the truck is in the proper position.

Then when the truck has spread its full load, it is not necessary for the men to get inside and unhitch the chain. They just slip the chain out of the notches and the truck pulls clear of the box and stops. Then in the clear they unhook the chain and the truck pulls away. 547:35



C. & E. M. Photo

The Slag Spreader Designed by Anthony De Salvo

Small Crawler Crane Carries 50-Foot Boom

Designed especially for erecting oil tanks for a new refinery, two small crawler cranes weighing less than 15,000 pounds and carrying a 50-foot boom have been built by the Harnischfeger Corp., Milwaukee, Wis., for the Standard Oil Company of California. They have special booms of light, welded tube construction, double the standard 25-

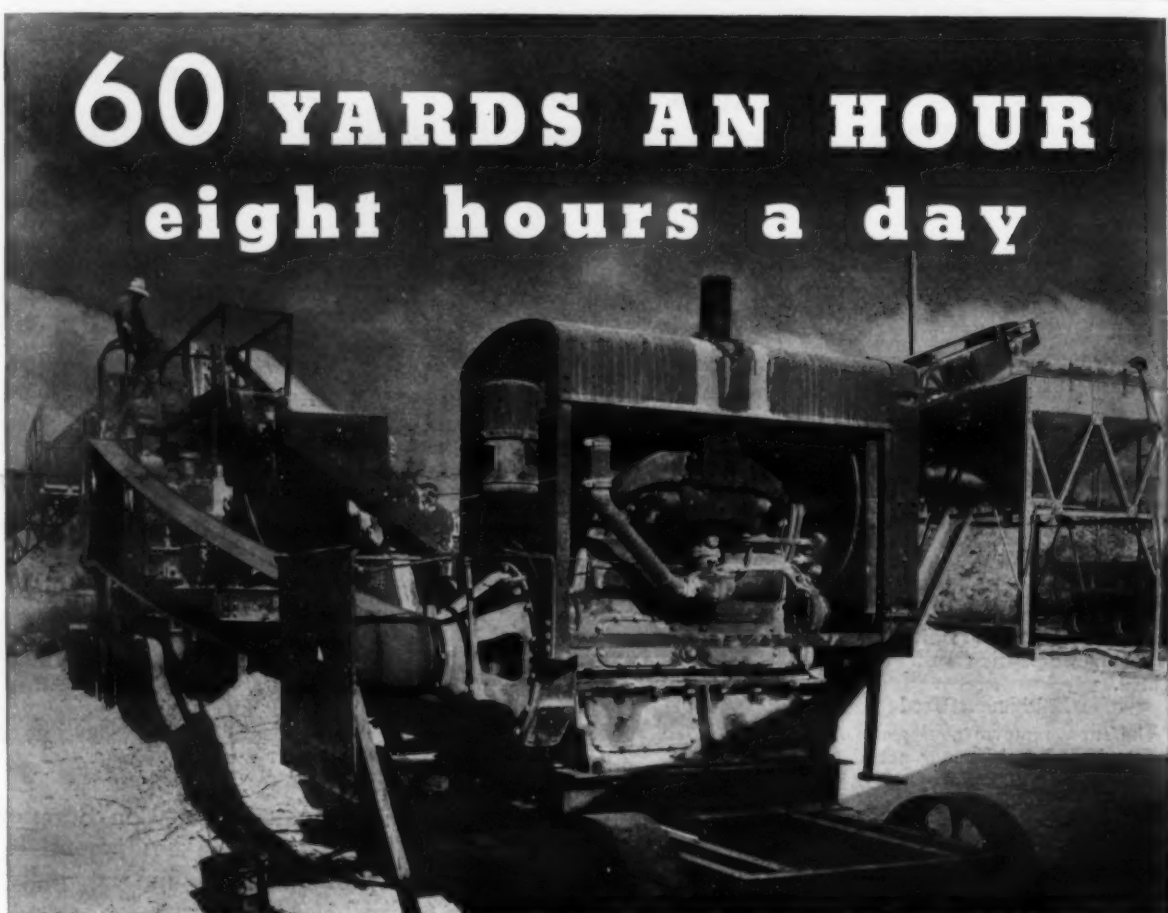
foot length and made with two boom inserts of 10 and 15 feet. Other special equipment includes high gantry, and telescopic boom stops.

Although the rated lifting capacity of the P & H Bantam-Weight machines is 1800 pounds at 20-foot radius, actual tests proved that the machines would lift 2,150 pounds at this distance and travel and swing them at reasonable speed with ample stability.

The Alexander Milburn Company

Standardized Cutting and Welding Apparatus, Paint Spray Equipment and Portable Carbide Lamps. Write for catalog.

1409 W. Baltimore St.
Baltimore, Md.



● Powered by a Waukesha WK gasoline engine ... 4 cylinders, 105 hp., 6 $\frac{1}{2}$ x 8 bore and stroke... running continuously eight hours a day... this portable Pioneer crushing-screening plant is turning out 50-60 yds. of aggregate an hour for Kenosha County, at Silver Lake, Wisconsin.

This Super-Four Waukesha Engine has proved itself in such continuous field service for over ten years. Constant engineering refinements have built into it the utmost reliability. The massive frame, with its five main bearings and truncated cylinders, gives it a sturdiness not found in any other four-cylinder engine of the same displacement. The heat-treated crankshaft, with five large 3 $\frac{3}{4}$ -inch main bearings and

3 $\frac{3}{4}$ -inch crankpins, enables it to take the shock loads and stand up under continuous service without attention or adjustments.

Waukesha Super-Four Engines are built in three sizes, from 80 hp.-120 hp. Write for Bulletin 540. Waukesha Motor Company, Waukesha, Wis.

SEE THE WAUKESHA COMET

DIESEL

AND THE WAUKESHA-HELSELMAN

OIL ENGINES

AT THE

"OLD-FASHIONED ROAD SHOW"
CLEVELAND, JAN. 18-24, 1936

SPACE C-16

WAUKESHA ENGINES



For the Largest and Smallest Jobs

Write for Catalog describing the complete "Con-weigh" line of dependable anti-friction troweling and return idlers, tripplers and accessories. They will measure up to the most rigid requirements of the largest as well as the smallest job.



PORTABLE MACHINERY CO.

Division of A. B. FARQUHAR CO., Limited

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TO GALION

Take the Right Road to Better Equipment

If you are looking for the latest developments, the last word in Road Machinery design and operation . . . then, take the road to Galion. The way is safe . . . the going smooth . . . there are no detours. Ask any user of Galion Equipment . . . he will tell you that you make no mistake in turning down the Galion Highway.

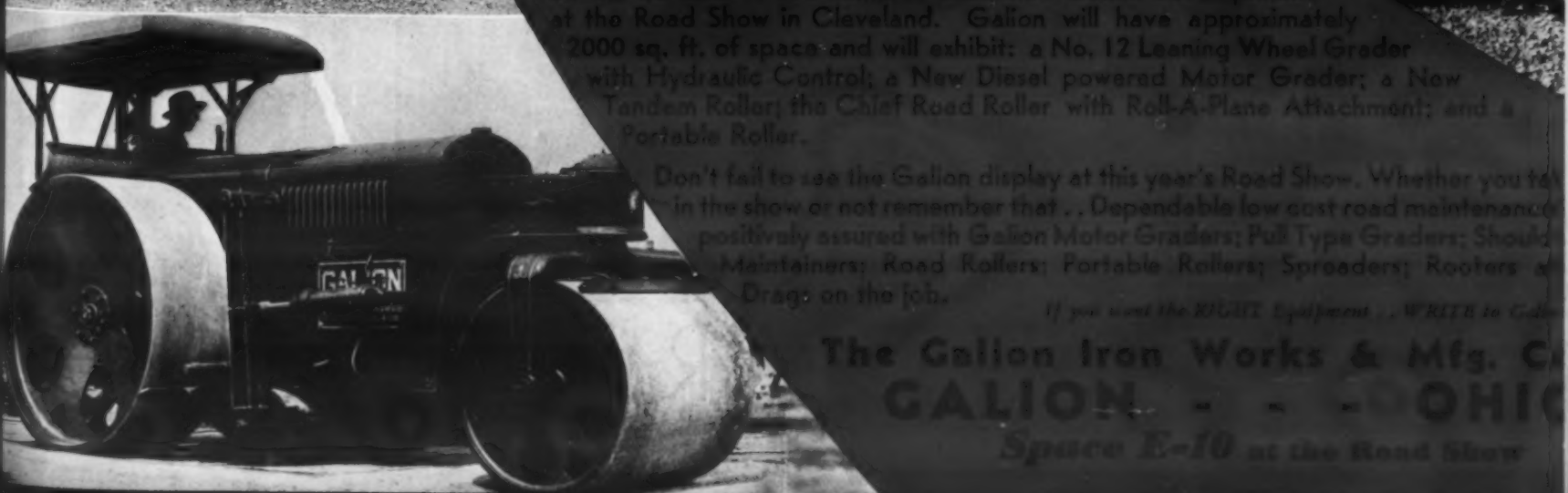
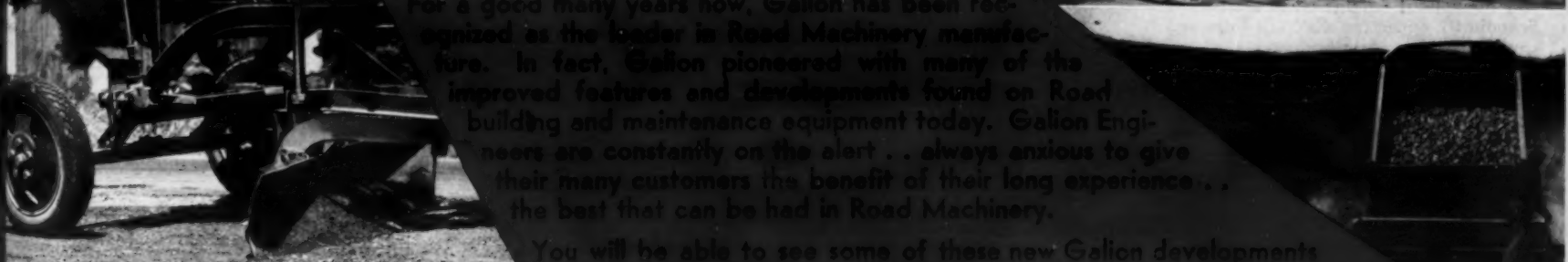
For a good many years now, Galion has been recognized as the leader in Road Machinery manufacture. In fact, Galion pioneered with many of the improved features and developments found on Road building and maintenance equipment today. Galion Engineers are constantly on the alert . . . always anxious to give their many customers the benefit of their long experience . . . the best that can be had in Road Machinery.

You will be able to see some of these new Galion developments at the Road Show in Cleveland. Galion will have approximately 2000 sq. ft. of space and will exhibit: a No. 12 Leaning Wheel Grader with Hydraulic Control; a New Diesel powered Motor Grader; a New Tandem Roller; the Chief Road Roller with Roll-A-Plane Attachment; and a Portable Roller.

Don't fail to see the Galion display at this year's Road Show. Whether you take in the show or not remember that . . . Dependable low cost road maintenance is positively assured with Galion Motor Graders; Pull Type Graders; Shoulder Maintainers; Road Rollers; Portable Rollers; Spreaders; Routers and Drags on the job.

If you want the RIGHT Equipment . . . WRITE to Galion

The Galion Iron Works & Mfg. Co.
GALION - OHIO
Space E-10 at the Road Show



Soil Mechanics Conference Scheduled for June, 1936

An International Conference on Soil Mechanics and Foundation Engineering is to be held at the Graduate School of Engineering, Harvard University, Cambridge, Mass., June-22-26, 1936. The primary purpose of this Conference is to make available the best existing information in these fields and to prepare the ground for better coordination of future work.

Engineers actively engaged in earth and foundation engineering know only too well the difficulties involved in obtaining reliable up-to-date information on investigations of importance in connection with their work. If sufficiently familiar with the principles of modern soil mechanics, they sometimes undertake the solution of their own problems. Such work frequently represents unnecessary duplication of previously unpublished investigations. In other instances it may lead to valuable results not elsewhere obtainable. In any case, after the studies or observations have served their purpose they are usually filed away and, perhaps, forgotten. Thus, a large amount of data of this type exists which should be made available to the engineering profession. In the second place, some of the most valuable contributions to a scientific approach to the problems in earth and foundation engineering are connected with circumstances which preclude publication. Only through personal contacts is it possible to learn the results and conclusions of such work. Finally, publication of the results of investigations carried out in research institutions is often seriously delayed. This condition is due partly to a lack of suitable periodicals, partly to the reluctance of many investigators to publish in a partial form the results of an investigation that are not entirely complete.

The Committee on Organization has decided that all important contributions to this Conference are to be made available to interested members sufficiently in advance of the Conference to permit careful study and preparation of discussions. The Conference itself will be devoted almost entirely to the formal discussions of the papers and to an informal exchange of ideas.

Complete information regarding the International Conference and an application form which must be returned to the Secretary of the Conference not later than May 1, 1936, may be secured from Arthur Casagrande, Secretary, International Conference on Soil Mechanics and Foundation Engineering, Graduate School of Engineering, Harvard University, Cambridge, Mass.



20' Back-up Spread, 1/2" Chips

KOB Disc Spreader

patented 1929

Spreads sand, gravel, chips, shale, cinders, or chloride.

Fits any dump truck, large or small.

Makes icy hills and curves safe.

See your local dealer or write us for further information

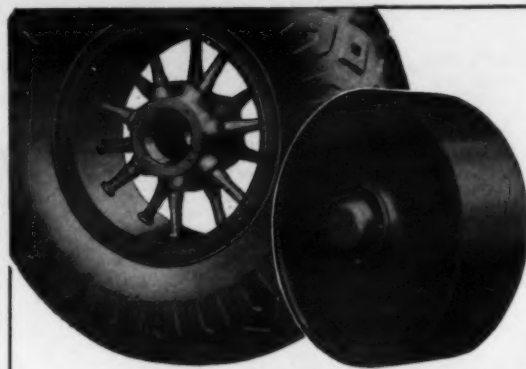
KOB MFG. CO.

309 E. Brown St., Milwaukee, Wis.

New A.C. Electric Plant—Stationary or Portable

A new light-weight alternating-current generating plant delivering 350 watts at 110 volts and 60 cycles has been announced by D. W. Onan & Sons, Minneapolis, Minn., for 1936. It is built particularly for the job that must provide its own electricity and is manufactured in a standard type and a light-weight type for portable use.

These machines are fully enclosed, streamline in design and built with a 4-cycle engine of 1-horsepower operating at 1800 rpm. The engine is equipped with magneto ignition, float feed carburetor, governor and pressure lubrication through the crankshaft to the connecting rod. The plant is furnished complete, ready to run, with a capacity sufficient for ten to twelve lights and small appliances. There are ten distinct sizes and fifteen models of other Onan a.c. generating plants in sizes up to 3000 watts capacity.



The sure foundation for all portable equipment

ELECTRIC STEEL WHEELS

The experience accumulated in the designing and making of many millions of wheels for American industry is available to equipment manufacturers. Put your wheel problem up to our engineers.

Ask for Bulletins 250 and 265

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INSURE your profits with modern Bucyrus-Erie speed, power and control. Modern speed that increases output through fast digging, swinging, dumping, moving. Modern power that digs dirt fast and means sustained speed through the toughest going. Modern control that puts safely in the operator's hands full use of the speed and power built into these outstanding machines. Profits, impossible with obsolete machines, are within your reach when you apply modern Bucyrus-Erie performance to your jobs.

profit



BUCYRUS-ERIE

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

Hot-Mix Surface Gives New Deal to Main St.

(Continued from page 1)

fleet of nineteen trucks hauled the hot-mix from the contractor's own plant in Columbus, a distance of 24 miles. There were four trucks owned by the contractor and each hauled 6 tons. These Sterling trucks were used to set the pace for the fifteen other trucks that were hauling 5-ton loads on 1½-ton chassis. They were all Dodge, Ford and Chevrolet trucks. It might be said that it was not really necessary to set a pace for the hired trucks which were paid by the ton delivered for they traveled at the legal speed of 45 miles an hour both ways and some of them made five round trips a day. They worked an 8-hour day the same as the plant which meant starting very early in the morning and quitting around 3:30 in the afternoon.

The plant delivered about 45 tons an hour for the full day, making an average varying from 360 to 400 tons per day for the job 24 miles away. They ran top in the morning and leveling course and binder in the afternoon. The trucks backed into the job and dumped on one of the four heavy sheet iron dumping boards. There were two in front of the finishing machine and one on either side where the work of spreading was done by hand. Eight men were required to handle the shoveling from the two dumping boards in front of the finishing machine and four men on either side with the assistance of two rakers on a side and a lute man on either side. A total of 75 men was employed on this contract, working an 8-hour day and 30 hours a week.

The operator of the Jaeger-Lakewood 30-foot finishing machine watched the load on his screed carefully and saw to it that it was uniformly loaded at all times. The weight of the machine itself and the power of the Hercules engine used to drive it insured the slow, even forward progress so necessary to successful operation of this type of work.

Rolling the Hot-Mix

There was no diagonal rolling on this contract. All the work was done with three 10-ton rollers, two Buffalo-Springfield tandem rollers, and the first of the new three-axle rollers of this same company to be used in the East. This machine has four wheels, the new roll being added in front of the standard front roll and is steered in the same radius as the front roll. The extension roll is fully machined like the others and its weight cantilevered forward gives a compression of 100 pounds per square inch more on the center roll than with the standard 10-ton tandem roller. This large machine established a remarkable record for the contractor in the elimination of bumps as recorded by the bumpometer which was constantly run over the completed pavement. There were only two bumps in the first mile of pavement, one at a hand raked intersection and the other at a catch basin where it was not thought advisable to run the roller lest the casting be broken. The new machine did about 65 per cent of the rolling on the job.

The rolls of the machines were lubricated with water fed from small tanks mounted on the rollers and spread over the rolls by flat hemp pads held close to the rolls by heavy screen cloth. A tank truck consisting of a 2½-ton chassis and a 600-gallon tank with a Jaeger portable pump mounted on a small platform at the rear was used to pick up water from a nearby creek and pump it to the roller tanks.

Personnel

It should be mentioned first under this heading that all the roller men, other operators and laborers on this contract were selected from the relief



C. & E. M. Photo

The Two Types of Rollers Used to Compact the Hot-Mix and Eliminate Bumps

rolls of Delaware County in which the project was located. The contract for this 2-mile resurfacing project was awarded to B. F. Patterson of Columbus, Ohio, for \$51,422.08. Frank A. Fellows was Superintendent of paving and Harold Dennison, Superintendent of the plant which produced the hot-mix. For the Ohio Department of Highways the work was done under the di-

rection of Ed Linzel, Assistant Division Engineer and Lot Jones was Resident Engineer.

Operating a Wagon Drill

The eighteen exclusive features of the Cleveland DR6 wagon drill as well as a

large blue print showing twelve operating positions are included in Bulletin No. 111 which has recently been issued by The Cleveland Rock Drill Co., 3734 E. 78th Street, Cleveland, Ohio. The nominal road gage of this drill is 4 feet-8½ inches but with the wheels swiveled inside, it has a gage of 3 feet 4½ inches and can be readily operated in a 5-foot trench. The rig is only 7 feet in length and has an overall width of 4 feet 10½ inches.

Get
**CLEAN
SAND
and
GRAVEL**
with

EAGLE WASHERS

Screw and Paddle type machines to meet particular washing and cleaning problems in sizes to suit capacity requirements. Send for bulletin W2 for complete information.

EAGLE IRON WORKS
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TELSMITH AT THE GRAND COULEE DAM



A No. 20 TELSMITH PRIMARY BREAKER CRUSHES ALL THE ROCK FOR THIS BIG PROJECT



Why was the TelSmith Primary Breaker selected by the M-W-A-K Co. for the million dollar aggregate plant at the Grand Coulee Dam? Why was the entire responsibility for crushing all oversize from the Brett pit, 20 inch to 6 inch boulders, placed on TelSmith?

Because TelSmith never fails... it is the outstanding performer on hard rock. It has a fixed shaft and sleeve eccentric. Short and compact,

it has a steel frame and steel crown. Force feed oiling permits higher eccentric speeds and faster gyration. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. TelSmith's parallel pinch starts immediately... stops slippage... crushes full tilt all the way down... guarantees bigger capacity. Investigate TelSmith's guarantee against breakage, even by tramp iron. Write for Bulletin C-34.

B-1-36

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TELSMITH

Highway Widened With Asphalt Strip

Road Maintenance Forces Increase the Capacity of Western Massachusetts 18-Foot Macadam Road

By C. B. RAYMOND, Senior Civil Engineer, Massachusetts Department of Public Works, Greenfield, Mass.

AN experimental project for widening State Route 9 in Massachusetts was started in 1934 at the Pelham-Belchertown town line and continued southerly for 10,000 linear feet. The work has proved very satisfactory both for the additional width, allowing a motorist to meet conveniently the through-line bus or a 5-ton truck, and also to cut out entirely the maintenance of the old macadam edge and gravel shoulders at the side of the road. The widening is giving a more adequate accommodation to the increasing automobile travel and will encourage the building of a section each year until such time as the project is completed or funds are made available for reconstruction.

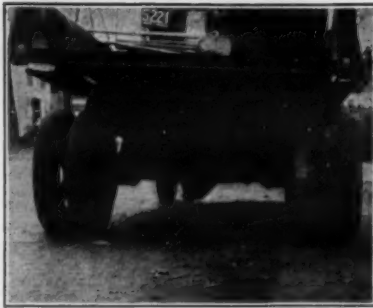
During the last few years, the maintenance of the macadam edge of this road, as well as the gravel shoulders, became a constant problem for the Town Superintendent, and, after endeavoring not too successfully to maintain the edge in good alignment with bituminous patching material as well as to keep the gravel shoulders in fair condition, it was decided to utilize a limited amount of the Town's Chapter 81 maintenance funds and widen the 18-foot surface an additional 2 feet which in this case was all that was available, unless the cuts and embankments were widened out and the guard rail set back, the expense of which at this time would have been prohibitive, due to the limited funds available. This part of the road system is maintained by the Town of Belchertown which receives financial assistance from the Commonwealth of Massachusetts under the provisions of Chapter 81, Act of the Revised Statutes, requiring all the work under this class to be supervised by the engineers of the State Department of Public Works.

Procedure

The procedure followed in widening the old 18-foot macadam surface is first to excavate the gravel shoulder to a depth averaging 5 inches for a width of 2 feet, by hand labor, casting the material on the roadside to be graded off later where the work is adjacent to a fill, or if in a cut, the surplus is moved by truck to widen embankments, thus utilizing all material. Any poor shoulder material is replaced with a good quality gravel, and the bottom of the trench finely graded and rolled. The edge of the old macadam is then trued up to form a good line.

The base or first course of trap rock consisting of No. 1 and No. 2 mixed stone from $\frac{3}{4}$ -inch to $2\frac{1}{4}$ -inch, is then spread to a depth of 3 inches in the trench, thoroughly rolled by a loaded $1\frac{1}{2}$ -ton truck equipped with a Lawrence steel roller wheel placed over one pair of dual pneumatic tires on a rear axle. Usually the right rear wheels are replaced for this purpose. The voids in the rolled base course are then filled with sand and thoroughly broomed.

The top course of trap rock consisting of No. 2 stone from $\frac{3}{4}$ -inch to $1\frac{1}{4}$ -inch is then spread to a depth of 2 inches after rolling, which is also done with a $1\frac{1}{2}$ -ton truck. An application of emulsified asphalt, Massachusetts State Specification 12B, of 0.75-gallon per square yard is then applied by a truck



Rolling a Typical Bituminous Widening Strip With a Lawrence Auxiliary Roller Wheel

distributor. The voids in this upper course are then thoroughly chinked in, using $\frac{1}{2}$ -inch and $\frac{3}{4}$ -inch trap rock chips, and rolled in by the truck.

A second application of the same specification emulsified asphalt is made of 1 gallon per square yard which is covered with 20 pounds per square yard of $\frac{1}{2}$ -inch stone chips and rolled. A day or two later, a third application of 0.25 gallon emulsified asphalt is applied as a seal coat and covered with about 25 pounds per square yard of a good quality sand. The shoulder is then trimmed up and travel allowed on the new work.

Cost

The cost of the widening, including excavation, grading, trap rock, asphalt and rolling, has been about \$1.13 per square yard. The price of the stone at the quarry is \$1.00 per ton and the haul 11 to 12 miles, while the asphalt costs 12 cents per gallon applied.

Official figures, plus estimates made in cases where official figures are not available, show that diversion of highway revenues took a toll of approximately \$200,000,000 from the road building program in 1934. Diversion for the current year may total an equal amount.

OLD FASHIONED ROAD SHOW Convention
JANUARY 20-24
1936
CLEVELAND, OHIO.

ALLIS-CHALMERS

for 1936

LINE OF TRACTORS AND ROAD MACHINERY

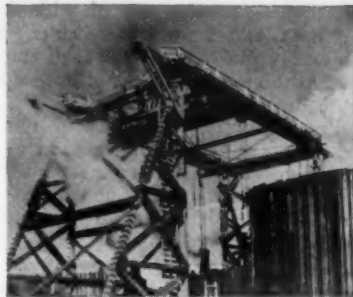
MODELS "L-O" AND "L" OIL & GAS TRACTORS	MODELS "K-O" AND "K" OIL & GAS TRACTORS	MODEL "WK" AND "WK-O" — WIDE TREAD
MODEL "WM" — WIDE TREAD	MODEL "M" — STANDARD TREAD	MODEL "IU" INDUSTRIAL TRACTOR
MODEL L-90 POWER UNIT	MODEL E-60 POWER UNIT	MODEL U-40 POWER UNIT
MODEL W-25 POWER UNIT		

Crawford Appointed Manager of G-E Construction Sales

J. H. Crawford has been appointed successor to the late Frank W. Hall as Manager of the Construction Materials Sales Division of the General Electric Company's Merchandise Department, Bridgeport, Conn. Mr. Crawford was first employed by G-E at Schenectady in 1905. He was transferred to Bridgeport in 1925, becoming Manager of Conduit Sales in 1928 and Assistant Manager of the Construction Material Sales Division in 1932.

Gang Pile Driver Used at Grand Coulee

A most interesting and ingenious pile driver rig has been set up by Mason-Walsh-Atkinson-Keir Co., contractors, to sink the sheet piling for the cofferdams at Grand Coulee. The McKiernan-Terry hammers, suspended on steel cables, are raised and dropped by electric hoists. Three such rigs are used, each comprising a battery of six P & H electric hoists of 5-ton capacity and operating six hammers. The hoists are mounted in series on an I-beam trolley.



One of the Gang Pile Driver Rigs Used by M-W-A-K Co., at Grand Coulee

Many States Start Surveys For Future Highway Plans

Highway planning surveys have recently been started in Pennsylvania, Ohio, Illinois and Michigan. Other states including Iowa, Missouri, Nebraska and Kansas are preparing to make similar surveys sponsored by the U. S. Bureau of Public Roads and conducted under the supervision of its engineers in cooperation with engineers employed by the various state highway departments.

The purpose of the surveys is to select an integrated highway system to include all roads to be improved in the next twenty years and to indicate the priority of construction on each. These surveys will record the present state of all parts of the selected mileage in respect to traffic service ability and will indicate the amount, kind and cost of further improvement required to reach fully satisfactory service ability. They aim to budget highway operation over a considerable future period and to indicate sources from which the necessary funds should be and can be obtained, properly related to the benefits conferred.

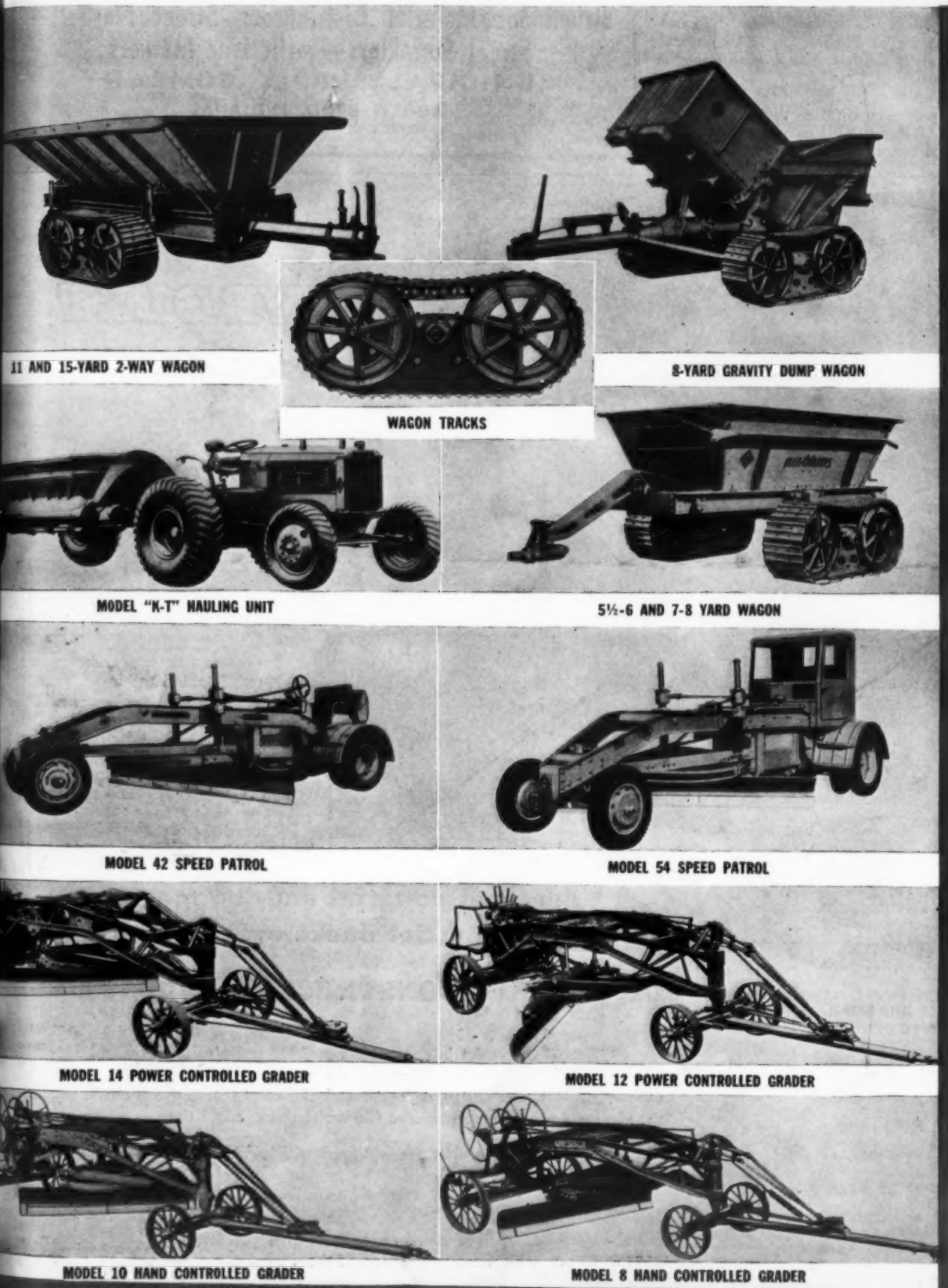
Michigan started organization October 28 under the direction of State Highway Commissioner Murray D. Van Wagoner and G. D. Kennedy, Business Manager and Consulting Engineer for the Highway Department. Work will be in immediate charge of Fred C. Taylor, formerly engineer for the State Planning Commission. The Road Inventory Survey will be under the direction of Richard H. Barkell, formerly right-of-way engineer for the State Highway Department, and financial studies will be under the direction of J. C. Finney, a certified public accountant and member of the Bar.

Jensen, Bowen and Farrell, engineers, Ann Arbor, Mich., have made available the services of their Traffic Engineer, D. Grant Mickle, for the direction of the traffic branch of the survey. Fourteen important count stations will be operated twenty-four hours a day for an entire year; 396 stations will provide density figures and traffic classifications on fourteen different days of the year for eight hours each and at 6,000 stations similar facts will be gathered once for each of the four seasons. In addition to density a complete factual study of truck loads, commodities carried and origin and destination will be made at 126 points fourteen times during 1936.

1934-5 Highway Employment Scored Another High Mark

Directly and indirectly Federal highway activities accounted for more than 5,000,000 man-months of employment for the year ending 1935, according to the annual report of Thomas H. MacDonald, Chief, U. S. Bureau of Public Roads. The average full-time direct employment on road work involving Federal funds was 182,605 men or more than 2,000,000 man-months. Indirect employment averaged approximately 1.4 times the direct employment, or about 3,000,000 man-months. Highway construction for the fiscal year was just about equal to the record for the preceding year. Road building in each of these years exceeded previous records.

The Public Works highway program was initiated in June, 1933, and by June, 1935, roads completed totaled 24,600 miles, enough to encircle the earth. At the same time 8,529 miles was under construction and 1,427 miles had been approved for construction, a total of 34,556 miles. Of the mileage completed and under construction 17,341 miles were on the Federal-Aid system, 2,413 miles on extensions of the system into and through cities and 13,376 miles were secondary or feeder roads.



11 AND 15-YARD 2-WAY WAGON

8-YARD GRAVITY DUMP WAGON

WAGON TRACKS

MODEL "K-T" HAULING UNIT

5½-6 AND 7-8 YARD WAGON

MODEL 42 SPEED PATROL

MODEL 54 SPEED PATROL

MODEL 14 POWER CONTROLLED GRADER

MODEL 12 POWER CONTROLLED GRADER

MODEL 10 HAND CONTROLLED GRADER

MODEL 8 HAND CONTROLLED GRADER

... who are more interested in value and performance ... Allis-Chalmers presents its new and improved line of road graders ... The new model "K-T" series with a new range of speeds. A new model "K-T" series with a new range of speeds ... up to 3.52 miles per hour ... with 40 H.P. ... And new, convenient controls. A new Model

"K-T" Hauling Unit ... hauls 5 to 8-ped loads from 2½ to 12 miles per hour. An improved line of road graders and Speed Patrols. An entirely new line of power units. A line of 60 Tractors that operate on Diesel Fuel with the advantage of having no engine trouble. Get more for your money in 1936-investigate the A.C. line before you buy.

ALLIS-CHALMERS TRACTOR DIVISION, MILWAUKEE, U.S.A.

Lubrication Queries

Is some lubrication problem bothering you? Tell us about it and we shall be glad to help you.

Question

Sometime ago you carried an item in which you recommended "flushing out the crankcase of a tractor engine" to remove heavy material which stuck to the sides of the crankcase. What is the best procedure for this?—Decatur, Ill.

Answer

When you are going to change the oil in the crankcase, simply remove the drain plug from the bottom of the oil sump and drain off the old oil while the engine is hot. It is best to do this when the oil is warm as it is more fluid and runs out more rapidly. Replace the drain plug and pour about 2 gallons of flushing oil into the crankcase of the tractor engine. Run the engine for three minutes, noting that the oil pressure gage shows pressure. Then drain off the flushing oil from the crankcase, and refill with fresh oil. The flushing oil may be used again if the foreign matter is allowed to settle and then removed.

If sludge is noticeable when draining the crankcase, the oil pump screen should be inspected and cleaned if necessary. This screen can be removed by taking off the cover on the left side of the oil pan on Caterpillar tractors. This answer is written with the Caterpillar Tractor Co. operators' instruction book for Caterpillar diesel Seventy-Five tractors before us.

Question

We constantly find grit in the oil that we purchase in drums. How can we be sure that the oil is free of grit?—Chicago, Ill.

Answer

No reputable manufacturer of lubricants would sell a drum of oil that had any grit in it. Without doubt the grit you find in the oil you are using is a result of carelessness in storing and handling the lubricating oils. This includes the drums in which the oil is stored as well as containers used in carrying the oil from storage to the machine. The maintenance man of one of our large machinery manufacturers wrote us some time ago,

"We have all seen perfectly good oil poured into a drum that had laid along the roadside exposed to dust-laden gusts of wind during dry weather and to rain in stormy weather. We have seen oil removed from storage drums and put

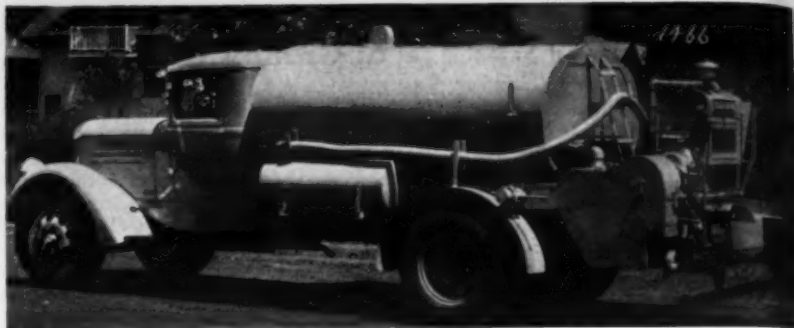
into quart measures coated with dust and the contents poured into an engine. An enemy placing a spoonful of emery dust in the engine could not have done more damage."

Practically all of the better manufacturers have been fairly successful in excluding dust from their machines by the use of dust shields but there is no way of controlling careless practices followed by operators.

Highway Research Board Publishes Part II of Its Proceedings

Part II of the Fourteenth Proceedings of the Highway Research Board will soon be ready for distribution. This consists of the papers which were presented in the Symposium on Research Features of Flexible Type Bituminous Roads at the last annual meeting of the Board.

Copies of this part of the Proceedings may be secured from the Highway Research Board, 2101 Constitution Avenue, Washington, D.C. Price: \$1.00.



South Bend

Bituminous Material Distributors—Street Flushers—
Street Sprinklers—Traffic Line Markers
MUNICIPAL SUPPLY COMPANY

SOUTH BEND, INDIANA
WRITE FOR NEW LITERATURE



A GENERAL MOTORS VALUE

the most powerful and the most
economical Chevrolet trucks ever offered to the

BUILDING AND CONSTRUCTION INDUSTRIES



Chevrolet introduces a new 1936 series of half-ton and 1½-ton trucks. They are the most powerful Chevrolet trucks ever built. They are the most economical Chevrolet trucks ever built. They are the most ruggedly constructed Chevrolet trucks of all time.

These new Chevrolet trucks are equipped with perfected hydraulic brakes . . . the safest ever developed. The famous Chevrolet high-compression valve-in-head engine develops tremendous power. It performs under all speed and load conditions with remarkable economy. In every feature and detail—frame, axles, springs—there is extra strength, designed for dependable service over an extra long period of time.

You are urged to inspect these new trucks and witness a demonstration of their ability. Compare their size and dimensions and their fitness to do your haulage jobs. And before you select any truck, get the facts on operating costs. Find out how and why these new Chevrolet trucks will save you money and increase your operating profit.

CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN

6%

NEW GREATLY REDUCED G.M.A.C. TIME PAYMENT PLAN
The lowest financing cost in G.M.A.C. history. Compare Chevrolet's low delivered prices.

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs

McKIERNAN-TERRY CORP.

19 Park Row, New York

Distributors in Principal Cities

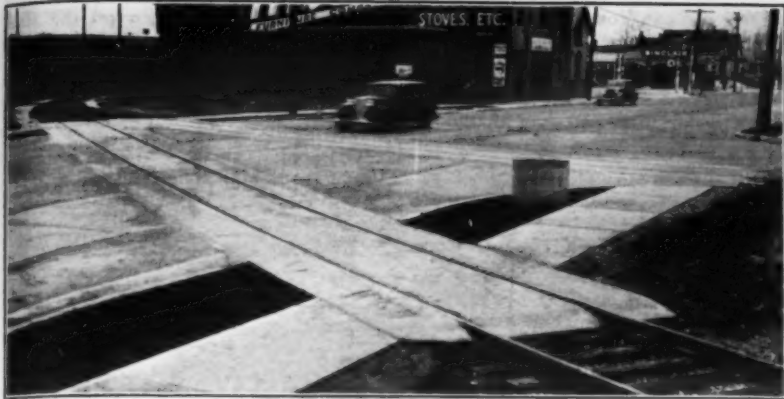
NEW PERFECTED HYDRAULIC BRAKES always equalized for quick, unswerving, "straight line" stops.



NEW HIGH-COMPRESSION VALVE-IN-HEAD ENGINE with increased power, increased torque, greater economy in gas and oil.



FULL-FLOATING REAR AXLE with barrel type wheel bearings on 1½-ton models.



The Completed Sheridan Road Crossing, Kenosha, Wis.

Level Railroad Crossing Built Without Detours

Permanently level railroad crossings can be built without interfering with trains or detouring traffic. The proof is in Kenosha, Wis., on Sheridan Road where an unusual technique was used in leveling the crossing over three industrial tracks of the Chicago & North Western Railroad.

Voids of a 12-inch layer of stone ballast were penetrated with cement grout producing a concrete slab foundation to carry the ties and rails. An 8-inch slab of mixed-in-place concrete was added to this base, bringing the crossing to the level of the concrete street paving. The work of preparing the road bed for the grouting was done by the railroad under the supervision of C. H. Perry, Division Engineer. The grouting and placing of the concrete slab was done by WPA labor.

The stone ballast was prepared and placed, the portland cement grout applied and the finished slab laid while freight trains serving several factories were moving over the crossing. The work included approximately 400 feet of track. Five freight trains passed over the rails while the grouting was in progress. The stone used for the 12 inches of ballast ranged from 3/4-inch to 2 1/2-inch. The grout readily penetrated the entire depth of the ballast and, when the cement had set, formed a continuous 12-inch base.

This procedure differs from the usual practice in that it provides a base substantial enough to remain level for years even under the double pounding of heavy trains and swift and heavy automobile traffic. The roughness of most railroad crossings is due to the settling of ties and rails. Automobiles go over this new crossing with no perceptible jar because the pavement surface and the rails are at practically the same level.

AED Member Celebrates Fifty Years of Wedlock

Frank B. Connelly of Billings, Mont., prominent distributor of construction equipment since 1905, with Mrs. Connelly celebrated their Golden Wedding Anniversary on December 1, 1935. The F. B. Connelly Co. was organized on August 1, 1904 as manufacturers' agents for farm and spring wagons, buggies and farm implements. The following year the company added equipment for the construction of highways, railway grades, sewers and irrigation and drainage ditches.

Wagons, buggies and farm implements were eliminated from the line in 1912 and Caterpillar tractors and automobiles were added. The latter were dropped in 1927 and electrical appliances added. The Connelly Machinery Co. was organized in 1922 to handle Caterpillar tractors and construction equipment. The company extended its operations on January 1, 1933, to the Pacific Coast and established branches at Seattle, Portland and Spokane. This company is a member of the Associated

Equipment Distributors. The Billings, Montana, Gazette in its leading editorial of December 1, 1935, refers to Mr. Connelly as "our first citizen. It is a title he deserves, which he has repeatedly earned, and which we know he will actively merit for years to come."

International Harvester To Have 3-Part Exhibit

A wide variety of equipment will be on display at the International Harvester Co. exhibit at the Annual Road Show in Cleveland this month. The exhibit will be divided into three groups, one consisting of five types of tractors, another of four types of motor trucks, and the third of seven types of power units.

The new International six-wheel motor trucks, the new line of two-speed axle Internationals on a 1 1/2-ton Model with dump body, the new Model PA-100 power unit, and the International Model TD-40 diesel TracTracTor and Model PD-40 diesel power unit will be included in the exhibit.

A New Self-Hardening Alloy Added to Buckets by Welding

Excavation in rocky soil produces tremendous wear on the teeth of shovels. Hascrome, a self-hardening chromium-

manganese-iron alloy, has been applied to shovel dipper teeth at Bonneville, Oregon, by the oxy-acetylene welding process. Results of the use of this alloy as a hard-facing material on four dipper teeth shows that replacements were finally required only after 336 hours of service in excavating rocky soil at the site of the cofferdam. This material is produced by the Haynes Stellite Co., 205 E. 42nd St., New York.



Dependable
2" to 8"
Self-Priming PUMPS

The choice of
Contractors
from
coast to coast

Write for copy of our combined catalog and valuable bulletin of engineering data —sent FREE on request.

Visit our Exhibit, Booth C-20, at the Road Show
Sterling Machinery Corp.
411-15 Southwest Blvd., Kansas City, Mo.

1936 JANUARY 1936

SUN	MON	TUES	WED	THUR	FRI	SAT
Let's go! Everybody off to a flying start on the New Year			1	2		4
5		7	8	OPEN HOUSE AT "AMERICAN HOIST" HEADQUARTERS—AT ROAD SHOW—SAVE THE DATE		11
12	13		15	16	17	
19	ROAD SHOW STARTS		22	23	ROAD SHOW CLOSES	25
26	27	28	ORDER YOUR NEW "AMERICAN" NOW		31	

THE
AMERICAN
GOPHER

AMERICAN HOIST & DERRICK COMPANY
SAINT PAUL, MINNESOTA



AMERICAN & SHOVELS
CRANES · DRAGLINES

Trucks and Trailers Busy at Tappan Dam

(Continued from page 5)

section by section.

Water for wetting the embankment material during rolling was furnished by a Jaeger 6-inch pump through a 4-inch pipe line laid along the toe and with hose carried across the fill as required for sprinkling.

Tunnel Excavation

The rock tunnel approximately 600 feet long and 7 feet 6 inches x 8 feet in cross section was excavated early in the contract as it provided work which could be pushed in winter, and then the concreting was delayed until early summer when the access road was excavated and the concrete plant set up on the roadway above the tunnel portal. An Ingersoll-Rand steam-driven 880-cubic foot air compressor provided the air for the operation of the I-R No. 75 drifters used in the tunnel while the rock excavation for the hillside cut-off trench was drilled with I-R jack hammers from a 310-foot portable compressor. Two I-R wagon drills were also used on the side hill work. Timken detachable bits were used on 1 1/4-inch steel for all drilling.

Personnel

The Muskingum Conservancy Project is being built under the direction of the Corps of Engineers, U.S.A., with Major J. D. Arthur, Jr., as District Engineer. Theodore T. Knappen, Senior Engineer, is Chief of the Engineering Division. The Tappan Dam is in the Dennison Area, S. M. Baily, Area Engineer. F. C. Sammons, Sammons & Robertson of Huntington, W.Va., was in charge for the contractor, with D. T. Hogue as Superintendent.

Cape Cod Canal Widened—Land Work With Scrapers

B. Perini & Sons, Framingham, Mass., have been doing a large amount of dirt moving—or should we say sand moving—in the widening of the Cape Cod Canal, grading slopes and placing revetment on the south side of the Canal near the Sagamore Bridge. The total yardage involves 196,000 cubic yards of material including both sand and silt which is pumped up from the bottom of the Canal.

Carryall scrapers which Perini has used on highway grading projects in Massachusetts were used to dig along the bank of the Canal, spilling the dirt in a dike parallel to the excavation, leaving a 30-foot berm. Three of these 12-yard scrapers hauled by diesel 75-hp tractors were used. The average haul is 600 feet per round trip and fourteen trips were made in 59.25 minutes or a trip every 4.23 minutes on a clocked test. At 7 pay yards per load, this figures 99 cubic yards an hour.

Construction Starts For Texas Centennial

Construction of the buildings for the Texas Centennial Exposition, June 6 to November 29, 1936, has begun. Concrete foundation piles for the \$1,200,000 Hall of State are each 30 feet long and 16 inches in diameter reinforced with steel rods. A total of 1200 of these piles has been driven into the black, waxy land lacking in bedrock at a reasonable depth.

Dallas, the site of the Exposition, is well-known for many notable engineering works such as the new 2-mile channel of the Trinity River dug at a cost of \$6,000,000 including the levees thrown up half a mile apart.

First Concrete Poured for Grand Coulee Dam

On Friday, December 6, 1935, after months of preparation, the first car of

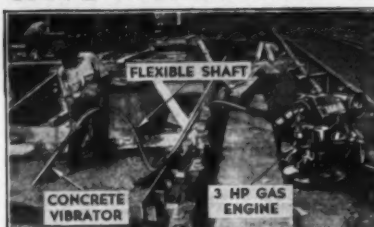
concrete ran out from the Grand Coulee mixing plant and the Governor of the State of Washington tipped the first bucket of concrete to be poured into what will be the world's largest dam.

Two of the "largests" and "firsts" connected with Grand Coulee are the largest conveyor ever used to handle excavated material, and the world's first

all-electric city which houses the staff of the contractors.

In addition to the official party accompanying Governor Martin and including officials of the Bureau of Reclamation, the Washington State Columbia Basin Commission, Senators and Representatives, about a thousand citizens of the Northwest stood in the snow to watch the ceremonies.

SAVE MONEY AND GET BETTER CONCRETE!



Cut your placement costs—get concrete into difficult places—and get a better bond with reinforcement with

MALL VIBRATORS

They do faster, better work than hand labor, and by the use of less water and sand, give a denser, stronger concrete; also, reduce pockets and patches to a minimum, and make form removal earlier. A type for every specific type of concrete work! Send for circular . . . and let us advise you regarding the proper MALL machine for YOUR job.

VISIT OUR BOOTH AT THE ROAD SHOW Space H-23

Bulletins on request

MALL TOOL COMPANY

7743 South Chicago Avenue CHICAGO, ILLINOIS

Announcing New 1936 DODGE TRUCKS

WITH THE MOST AMAZING GROUP OF ADVANCEMENTS IN TRUCK HISTORY

"PRE-PROVED" ECONOMY

Saves Up To \$95 a Year In Gas Alone

"FORE POINT" LOAD DISTRIBUTION

Increases Hauling Efficiency... Saves Tires and Upkeep

GENUINE HYDRAULIC BRAKES

Saves Tires, Relining and Adjustment Expense

BRILLIANT NEW STYLING

Builds Prestige...Helps You Get New Business



USE RIGHT BUCKET FOR THE JOB



Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.



THE HAYWARD CO., 22-34 Day St., New York
HAYWARD BUCKETS

DODGE announces sensational new 1936 trucks! Planned . . . engineered . . . and actually "Pre-Proved" to deal a smashing blow at truck costs in the lowest-priced field. This slashing of costs for truck users everywhere is accomplished by a combination of advancements new in truck history. Behind-the-scenes tests in the laboratory and in actual use from coast to coast indicate savings of up to \$95 in gas alone. Another 1936 feature, new

"Fore Point" load distribution, measurably increases hauling efficiency. The list of important money-saving advancements reads on and on. They are all set down in plain black and white for you in the 1936 "Show-Down" Score Card that gives comparative facts about all 3 lowest-priced trucks. Get a copy and see what Dodge has for 1936. You'll be amazed! See your Dodge dealer today!

DODGE

Division of Chrysler Corporation

STILL PRICED WITH THE LOWEST

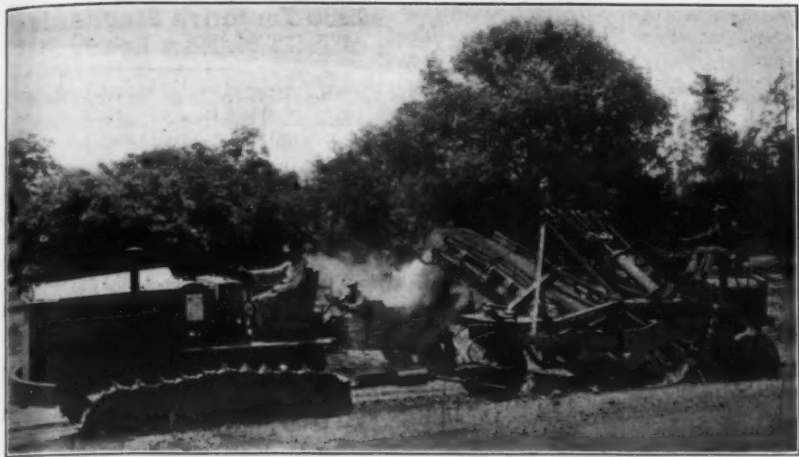
1/2 TON CHASSIS 6 CYL.-116" W.B.

\$370*

*List prices at factory, Detroit, subject to change without notice. Special equipment, including dual wheels on 1 1/2-ton models, extra. Through the Official Chrysler Motors Commercial Credit Company New 6% Time Payment Plan you will find it easy and less costly to arrange time payments to fit your budget.

DEPENDABLE

DODGE TRUCKS



The Elevating Grader Outfit Used for Street Widening in Newton, Ga.

Two Trucks a Minute Loaded by Georgia Outfit

Widening a city street, making cuts and filling in to State specifications, a tractor and elevating grader outfit owned by Irvin Bryant, Pine Park, Ga., loaded 120 trucks per hour. The outfit, a Cletrac 80 diesel and a 48-inch Austin-Western hydraulic-controlled elevating grader with a 19-foot carrier, started in Newton, Baker County, Ga.

The earth was hauled by 2-yard dump trucks of which there were enough so that the loads left the head of the elevator in a steady stream. Mr. Bryant had to take out 2,000 yards from one borrow pit. The cut could be made only 18 inches deep because the plot of ground was to be used as a baseball diamond and too deep a cut would spoil the final grade. In this pit, making a cut 18 inches deep and 16 inches wide, the elevating grader loaded three trucks each minute. Taking out the time necessary for turning at the ends of the borrow pit, he averaged a change of trucks three times per minute, loaded 120 trucks per hour, or moved approximately 250 yards per hour.

When cutting short elevations with more frequent turnings, this capacity was reduced to 200 yards per hour. This occurred when working in the streets of Newton.

On another contract for moving 50,000 cubic yards of dirt distributed over 5 miles, starting just south of Camilla toward Bainbridge, Ga., 30 per cent of the work was casting. The soil was loam and the cut was 16 inches wide and 24 inches deep. No difficulty was experienced in casting 400 to 500 yards per hour.

A.E.D. To Meet in Cleveland Two Days Before Road Show

The Associated Equipment Distributors are meeting Saturday and Sunday, January 18 and 19, 1936, at the Statler Hotel, Cleveland, Ohio.

The officers are: President, John C. Louis, Baltimore, Md.; First Vice President, J. S. Gilman, Minneapolis, Minn.; Second Vice President, G. F. Lowe, Chicago, Ill.; and Secretary and Treasurer, A. C. Blaisdell, Cincinnati, Ohio. The Directors are: O. B. Avery, St. Louis, Mo.; C. E. Baker, Los Angeles, Calif.; E. K. Hurst, Sioux Falls, S. D.; T. S. McShane, Omaha, Nebr.; L. J. Moore, Memphis, Tenn.; A. F. Sersenous, Portland, Ore.; and Edward A. White, New York, N. Y.

New Atlantic Coast Manager for Cummins Diesel Engines

C. D. Cummins has been appointed Atlantic Coast Manager for the Cummins Engine Co. of Columbus, Ind. His headquarters are in New York City and he will maintain a constant contact with all Cummins distributors along the Atlantic Coast. Both sales and service problems come under his jurisdiction.

C. H. & E. Moves Plant

C. H. & E. Mfg. Co., Inc., has moved into its new plant at 3849 No. Palmer St., on the north side of Milwaukee.

It has built a modern plant with a shop on one floor and offices on the second.

Chas. A. Rogers Killed in Auto Accident

Charles A. Rogers, President, Roger Bros. Corp., and pioneer manufacturer of trailers for handling heavy construction equipment, was killed in an automobile accident on December 12 on the Roosevelt Highway when returning from a deer hunting trip.

In 1905 Mr. Rogers founded the Rogers Bros. Co., which included two brothers, Louis, Vice President of the present Rogers Bros. Corp., and Hugh Rogers, Secretary of the firm. The company engaged in the construction and erection of steel bridges, erecting the first seven in Crawford County, Pa. In 1907 he moved with his family to Albion, Pa., where they have resided since that time, and began the manufacture of light auto trailers, ultimately entering the present business of making heavy-duty trailers.

Stibolt With French & Hecht

French & Hecht, Inc., metal wheel manufacturer of Davenport, Iowa, have appointed Victor A. Stibolt as Assistant to the President. Since completing his engineering studies at Cornell University in 1911, Mr. Stibolt has been associated with the Moline Plow Company, International Harvester Co., Rock Island Plow Co. and with the Southern Pine Association.

BERKSHIRE CONCRETE VIBRATORS

PNEUMATIC INTERNAL & EXTERNAL TYPES FOR—
DAMS • WALLS • COLUMNS • BRIDGES • PILING • PRODUCTS
WRITE
THE BERKSHIRE MFG. CO.
1100 POWER AVE. CLEVELAND, OHIO

WHAT TO SEE AT THE ROAD SHOW—

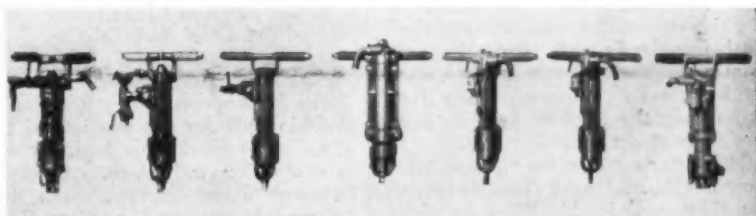
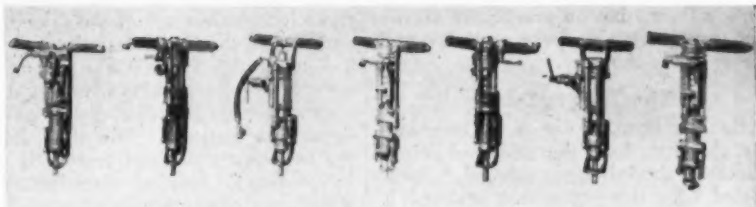
THE whole Cleveland Line will be on exhibit in Space No. F-28. Be sure to see our many sizes and types of Hand Hammer Drills, Paving Breakers, Pneumatic Diggers, and Tampers. Don't miss our Models DR and WD Drill Rigs. They are the outstanding rock drill design accomplishment of the year. While attending the Show you are cordially invited to be our guest at our extensive manufacturing plant. See how we make Cleveland Rock Drills, and observe a demonstration of any type of air tool which may interest you.

A bright new catalog awaits your request. Ask us about the newly revised Driller's Handbook. You get a copy free by filling in the coupon and presenting it to the attendant at our booth.

THE CLEVELAND ROCK DRILL CO.
3736 East 78th Street, Cleveland, Ohio

If you do not attend the Road Show, fill in the coupon completely and mail it to us. The book will be sent gratis to all bona fide rock drill owners and operators who apply.

14 Sizes and Types of Hand Hammer Drills!
10 Sizes and Types of Paving Breakers!
3 Drill Rigs!
Pneumatic Diggers and Tampers.



THE CLEVELAND ROCK DRILL COMPANY
3736 East 78th Street, Cleveland, Ohio.
Gentlemen:—Please send me the "Driller's Handbook."

Name _____
Company _____
Address _____

We are now using the following types of machines:

Hand Hammer Drills _____
Paving Breakers _____
Clay Diggers _____
Back Fill Tampers _____
Wagon Drills _____

Contractors Seek Economy in Power

Survey Shows Diesels Power Many Tractors and Shovels on Big Dam and Earth-Moving Jobs

FIVE years ago, the use of diesel power for construction equipment was Big News. Contractors, equipment manufacturers and even engine manufacturers were asking "What is all this about diesel engines?" They came to CONTRACTORS AND ENGINEERS MONTHLY with their questions, inquiring to what extent diesel power might be used in construction and requesting information on the comparative costs of this type of power which used such low-cost fuel.

In May 1930, there appeared a comprehensive article in CONTRACTORS AND ENGINEERS MONTHLY, quoting the opinions of authorities on the question, and predicting that diesels were not only here to stay but that their future was a big one. The increasing popularity of diesel power for construction equipment has not only backed up our predictions but has far surpassed them. A survey shows that on practically all the big construction projects of today, the diesel leads the way.

The Tops in Dams

Boulder Dam, as far as the spectacular, the hazardous, the much-publicized phases of the job are concerned, is completed. To the world that watched it grow, it was the pinnacle and the "new high" in construction. The harnessing of a riotous river has been accomplished, but before the first efforts of this power giant are transmitted over the high lines, another concrete behemoth, three times as large as the Boulder project, is already having its growing pains.

This new contender for "biggest ever" laurels is Grand Coulee Dam, under construction on Columbia River in northern Washington. It offers new problems for contractor and engineer—in cofferdams, earth-moving and transporting of equipment, and contains most of the obstacles confronted and conquered at Boulder Dam.

Grand Coulee lacks the concentration of effort and equipment found at Boulder. The working ground is spread out over many acres. It's a longer-haul job, an aggregate and dirt-moving task which first of all means track-type tractors and lots of them.

M-W-A-K, David Ryan, R. L. Rowland and G. F. Atkinson companies, in charge of construction, have lots of track-type tractors and they're rounding up more as the work progresses. Analysis of this power brings out in a striking manner the fact that the big job has "gone diesel." The first-named company, whose initials represent Mason-Walsh-Atkinson & Kier, is operating twenty-four diesel 75-horsepower tractors and one smaller machine of diesel power at Grand Coulee, a general survey of nine major government projects as of May 18, 1935, shows.

The Ryan Co. has seven diesel 75-horsepower tractors, and the Rowland Co. four, making a total of thirty-six diesel machines working on the project. According to the survey, a total of five spark-ignition tractors are owned by two of the contractors at Grand Coulee.

A change in plans, which means that the permanent base for the dam will be built rather than a low dam, only adds to the responsibility of the tractors. The change increases excavation volumes by 2,000,000 cubic yards, bringing the total of earth to 15,400,000 cubic yards. And that is the first thought of the observer—that Grand Coulee is an excavating job of unparalleled proportions.

Half of this yardage has already been moved, with the tractor fleet taking its share of the work. The diesels pull two crawler-type, 13-yard wagons in tandem, push bulldozers or haul 12-yard Carry-all scrapers. Loads are dumped on grizzlies, down to feeder conveyor belts which carry the spoil to the main conveyor. The outfits work 20 hours a day, drivers working in three shifts.

A study of the diesel tractors on the work shows that each has operated approximately 4,000 hours. Depending upon the task, the 75-horsepower machines consume from 3 to 4 1/4 gallons of 7-cent fuel oil hourly, which, according to contractors, revolutionizes operating costs. They add that maintenance costs have been low, despite the fact that many drivers operate the machines, that summer temperatures reach and top 110 degrees F., and that the diesels work in a pall of dust.

That the tractors have stood up under severe tests receives testimony in an order for immediate delivery of ten 10-ton diesel-electric locomotives to deliver concrete from the mixers to the dam in 4-yard buckets on flat cars. Engines in these locomotives are of the same make as those in the diesel tractors.

Leaving this \$63,000,000 project, the survey shows a striking array of diesel tractor power on other major government dam projects. And this, despite the fact that the diesel tractor is only in its fourth year of manufacture in the United States. A large proportion of gasoline tractors working on these jobs was purchased long before the advent of the diesel, owners state.

Diesels at Muskingum

The Muskingum Valley flood project in Ohio includes construction of eight dams and considerable highway work in connection with them. A total of forty-one diesel tractors, seven diesel powered-shovels, and a diesel-electric generating set may be found on the valley project, as compared to sixteen spark-ignition tractors. On the Wills Creek Dam, Eiff Construction Co. has eight 75-horsepower diesel tractors, a diesel generator and an elevating grader; on Mohawk Dam, Brewster Construction Co., five diesel 50-horsepower tractors and five diesel shovels; on highway work at Waverly, Johnson Construction Co. has put to work four diesel 75-horsepower tractors, a diesel 40-horsepower tractor, a diesel shovel and two gasoline tractors; at Clendenning Dam, Gavini Construction Co. has at work a diesel 75-horsepower tractor, seven gasoline machines and an elevating grader; at Tappan Dam, Sammons-Robertson Co., has five diesel 50-horsepower tractors, three gasoline machines, an elevating and a blade grader; at Beach City Dam, Eisenberg Construction Co., five diesel 75-horsepower tractors and two spark-ignition machines; on Charles Mills Dam, Ralph Myers, con-

tractor, four diesel 75-horsepower tractors, one diesel 50-horsepower machine and a diesel shovel; Senecaville Dam, Mercier Construction Co., three diesel 75-horsepower tractors, and at Piedmont Dam, American Aggregates Co., four diesel 75-horsepower tractors and a spark-ignition machine.

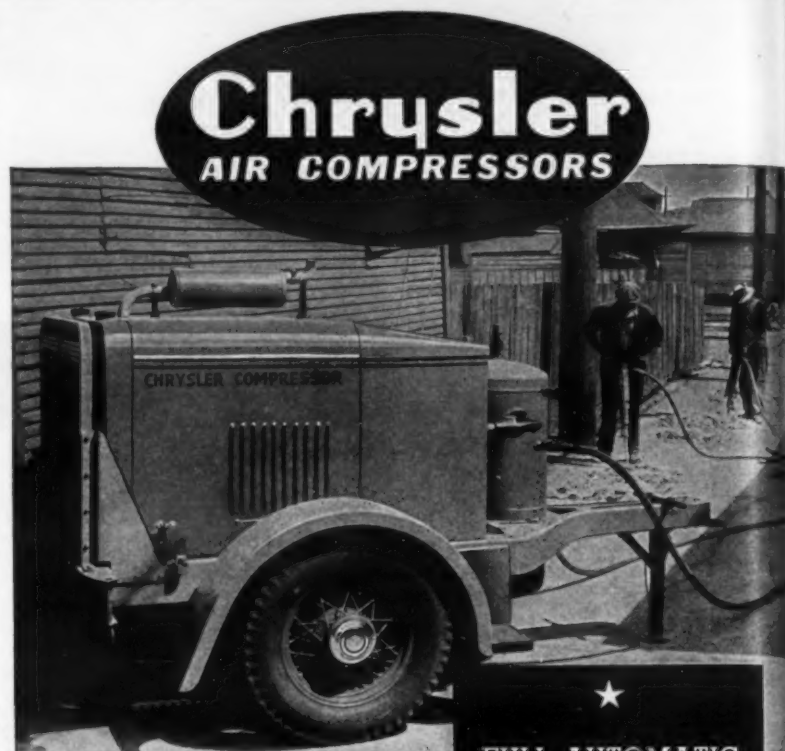
More at Bonneville

On Bonneville Dam, in Oregon, the four contractors have decidedly "gone diesel". Columbia Construction Co. has twelve 75-horsepower diesel tractors;

(Continued on page 39)

1935 Tentative Standards of A.S.T.M. Now Ready

The 1935 edition of the Book of A.S.T.M. Tentative Standards has just been published. Its 1500 pages contain 290 tentative standards of which 75 are included for the first time, some 65 were revised this year and are given in their latest approved form. Copies in cloth binding at \$8.00 each, or with heavy paper cover, at \$7.00 each can be obtained from A.S.T.M. headquarters, 260 So. Broad St., Philadelphia, Pa.



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THE LOW PLATFORM—That's why a ROGERS is so easy to load!

Figure your hauling on a cost-per-year basis.

Then you'll know why the ROGERS gives satisfaction to so many contractors.

Sizes: 10 tons, 4-wheel, to 45 tons, 12-wheel.

ROGERS BROS. CORP.
108 Orchard St., Albion, Pa.



Air Map Survey of Colorado River

(Continued from page 10)

the party receives periodical data on the stage of the river. River observations are taken at 4 each afternoon at Bright Angel, 100 miles up stream. At 7 each night this information is radio-phoned to the party from Milford, Utah. This is important because freshets, etc., cause sudden rises in the river level. A rise of 20 feet is not unusual. Any radical change in the river level during the night, for instance, would have serious consequences. Thus the party knows at all times what river levels to anticipate and can make the necessary preparations. Since it takes 13 to 14 hours for the condition observed at Bright Angel to reach the party, there is no danger of the party being taken by surprise. The party also radios its daily observations to Los

Angeles and the engineers in the laboratory are able to make their computations as the figures are supplied. This speeds up the general program and also makes it possible for Fairchild Aerial Surveys to know by the time the boats reach Pierce's Ferry whether the computations are correct. Otherwise it would be necessary to hold the boats and crews until the computations were completed, which would add considerably to the time and expense of the project.

Personnel

F. H. Woody is Chief Engineer of the Fairchild Aerial Surveys party; R. E. Whizand is Assistant Engineer; Frank H. Dodge is Chief Boatman. The Soil Conservation Service section is headed by Edward A. Shuch, chief photogrammetrist of the Soil Conservation Service. The flying part of the Colorado River Survey was already completed by Fairchild Aerial Surveys prior to the ground control expedition. This entire project is part of the Soil Conservation Service's program for the study and

control of the action of silt above Hoover Dam so that the Government will be able to determine if supplementary dams will be required.

Over 48,000 Communities With No R. R., Use Trucks

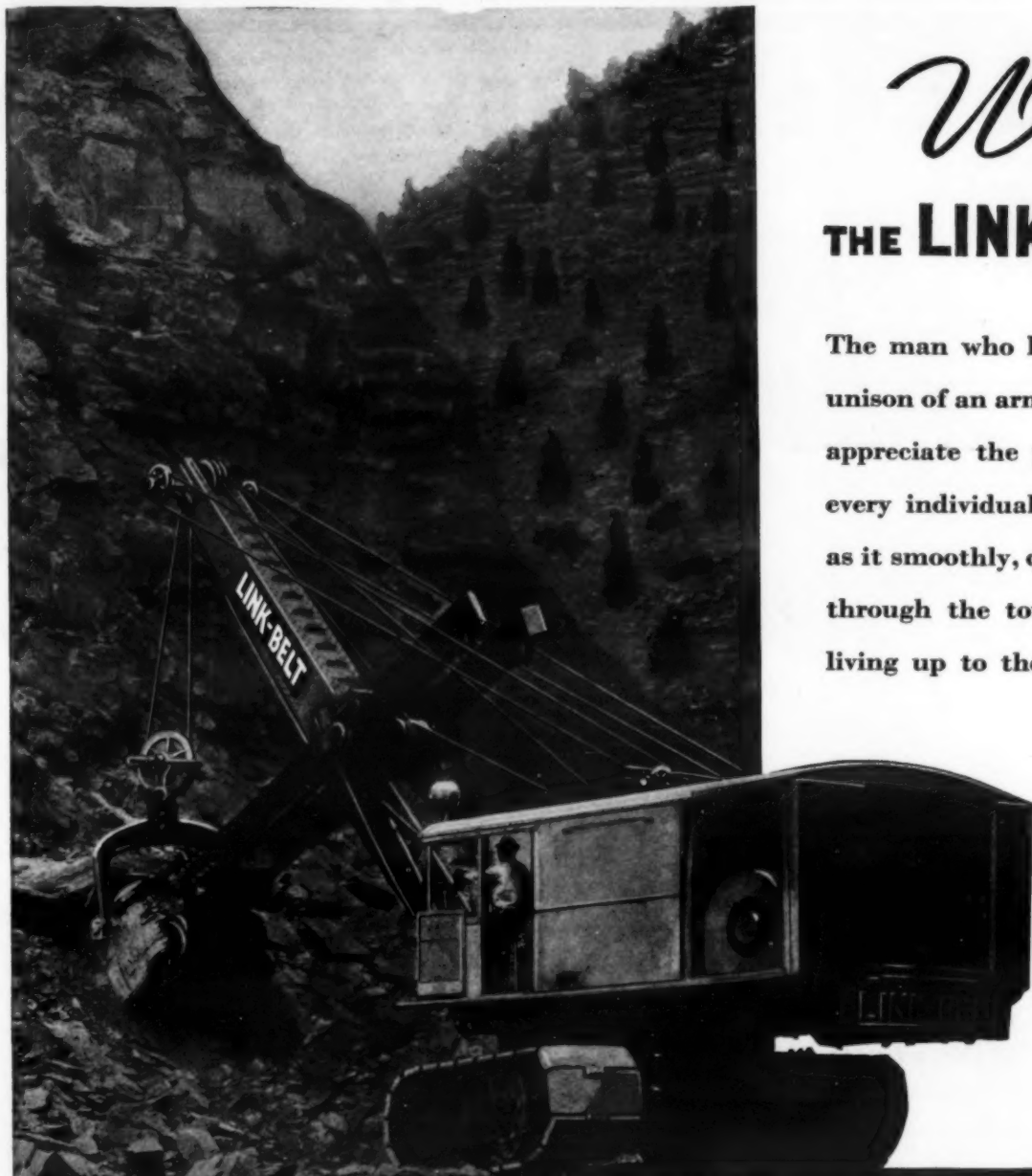
In the 1934 edition of "Motor Truck Facts" we find another argument for secondary road construction. There are 48,492 communities in the United States which are without railroad service and must depend upon motor truck service for the marketing of their products and the hauling in of the necessities and luxuries of life. This figure represents 39.6 per cent of all the communities in the United States. The communities not served by railroad have a total population of 7,844,509 or 6.3 per cent of the population of the United States. This one-sixteenth of the population of this country is responsible in large measure for the production of the foodstuffs and live stock consumed by the remainder

of the country so highway service to these communities is an all-important construction service of our state and Federal Governments.

R. G. LeTourneau Builds to Double Factory Space

The construction of a second large plant at Peoria, Ill., for R. G. LeTourneau, Inc., is now in progress. This company's first Peoria factory was built early in the spring of 1935 and the new addition which will adjoin the original building is of brick and steel, 300 feet long by 140 feet wide, with a 20-yard wing on each side. It will have a floor space of 42,300 square feet as compared with 30,000 square feet in the present plant.

The LeTourneau company began its manufacturing operations at Stockton, Calif., and still maintains a complete production and assembly plant there to supply the needs of the eleven Western states.



Watch THE LINK-BELTWORK

The man who loves team play . . . the unison of an army on the march . . . will appreciate the perfect coordination of every individual part of the Link-Belt as it smoothly, quickly and easily forges through the toughest jobs . . . always living up to the Link-Belt reputation.

From $\frac{3}{4}$ to 3 yds. capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

STABILITY-POWER-SPEED

LINK-BELT

SHOVEL-CRANE-DRAGLINE

LINK-BELT COMPANY
300 W. Pershing Road
Chicago

Offices and Distributors in All Principal Cities

Grader Made Dirt Fly on Nebraska Link

AS part of a connecting link between U.S. 73 and U.S. 75, Project NRH-246-B, running through Verdon in the southeast corner of the state, was instituted by the Nebraska Department of Roads and Irrigation. The contract for 3.4 miles of grading, drainage and paving was awarded to Dobson & Robinson who subbed the grading operations to Monarch Engineering Co. of Falls City, Nebr.

To handle most of the grading the subcontractor put in a Caterpillar elevating grader with a 42-inch belt operated by a power take-off from the Caterpillar Sixty tractor. Ten wagons with 3-up mule teams running under the grader belt handled an average of 1,200 yards of dirt a day although on the shorter hauls the yardage ran up as high as 1,500. Most of the hauls were above the average on this job so the teams and wagons were augmented with one or more of three McCormick-Deering tractors and Trail-It center-dump wagons which had a hauling capacity of 3 yards each.

A Speeder crane with a 5/8-yard dragline bucket was used to cut the rough 1 1/2:1 slopes on the larger cuts and then two men hand-trimmed for the final work. The Trail-It wagons worked with the dragline and hauled to the nearest fills.

An Adams 12-foot blade grader with a Caterpillar Sixty was used for spreading the fills, cutting back-slope and ditches, and handling the finishing of the grade.

Culvert Extension

The culvert work on this project was mostly extensions of existing structures as the old right-of-way had been widened and the new grade will handle heavier traffic.

An Ingersoll-Rand 110-foot compressor was used to break out the old culvert walls and a Construction Machinery Co. Silverstreak mixer handled the concrete for the new headwalls. On all old concrete box culverts 2 feet of the old culvert was cut away to expose the reinforcing for bonding the extension to the old structure. The pneumatic equipment was used for breaking up the old concrete boxes.

Six concrete box culverts were extended on this project, including one 6 x 3-foot, one 5 x 6-foot, two twin 8 x 8-foot, one 12 x 8-foot and one 8 x 8-foot. All concrete box culverts had soil saver walls on the upstream end which had to be replaced when removed

Monarch Engineering Co. Pushed Belt Grader and Dragline on Excavation to Move 1,200 Yds. a Day

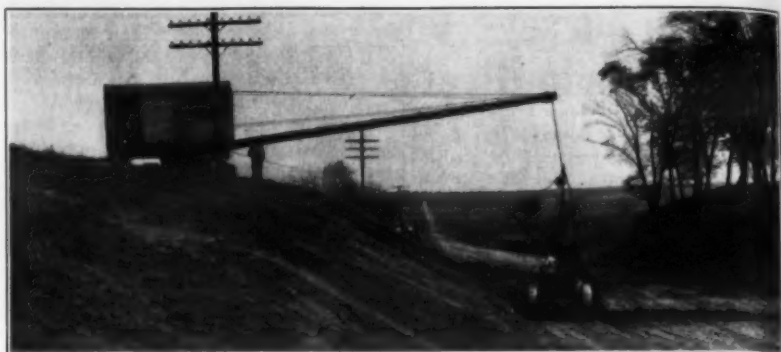
for extension. These soil saver walls varied in height from 3 to 10 feet.

Quantities

Earth excavation	59,000 cubic yards
Culvert excavation	835 cubic yards
Concrete for culvert extension	268.7 cubic yards
Reinforcing steel	24,694 pounds
Old structures removed	6
Headwalls removed	10
Corrugated iron pipe relaid	100
24-inch corrugated pipe	36 feet
30-inch corrugated pipe	33 feet
36-inch corrugated pipe	49 feet
Dowels, grouted into old structures	
5/8-inch x 2 feet	153
3/4-inch x 2 feet 6 inches	91
1/2-inch x 4 feet	96

Personnel

This contract, Project NRH-246-B, in southeastern Nebraska, was worked on a 10-hour day schedule. The Superintendent for the Monarch Engineering Co., subcontractor on grading was Bill Estel, and L. N. Ress was Project Engineer for the Nebraska Department of Roads and Irrigation.



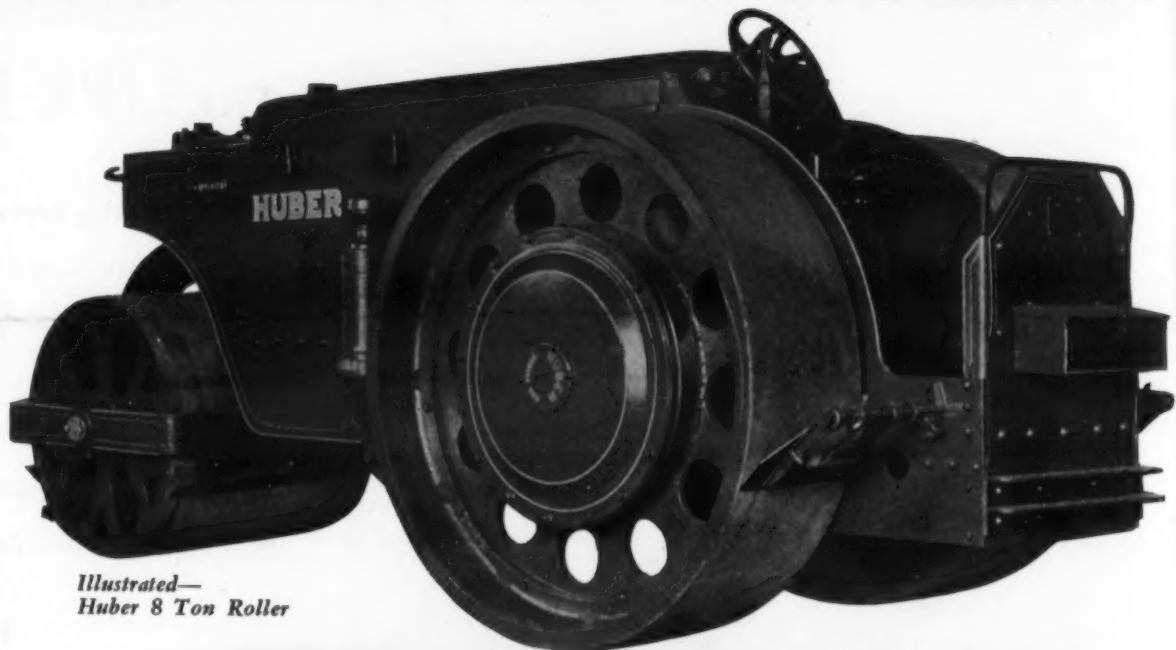
C. & E. M. Photo

Trimming Slope With a Dragline

Highway Funds Diverted

This subject will be discussed at the Convention and Road Show of the American Road Builders' Association in Cleveland, January 20-24. There will be reports on how to curb it.

A GREAT NEW ROLLER



Illustrated—
Huber 8 Ton Roller

by HUBER

The name HUBER on a road roller is your guarantee of satisfactory and economical service under all conditions. For years Road Contractors, State and County Highway Officials and all others connected with the building and maintaining of highways have vouched for the Huber Road Roller, proclaiming it the greatest piece of road equipment of its kind. Today Huber offers a still greater Roller with features designed to speed up your work and do a better job. You can't fully appreciate the new Huber until you have seen it perform—but in the meantime, we'd suggest that you send for our latest catalog describing the 5 TON, 6 TON, 7 TON, 8 TON and 10 TON Huber Road Rollers in detail. A post card will bring it.

Write for Descriptive Catalog

THE HUBER MANUFACTURING CO., MARION, OHIO
Manufacturers of HUBER Road Rollers and SUPERIOR Motor Graders

- SIX CYLINDERS
- FOUR SPEEDS
IN BOTH DIRECTIONS
- SIMPLIFIED CONTROL
- REPLACEABLE ROLL RIMS
- DUAL STEERING
HAND AND POWER
- HYDRAULIC SCARIFIER
- SHORT WHEELBASE
- ROLLER BEARINGS
THROUGHOUT
- RIGID FRAME



**Williams
"DXL"
Dragline
Bucket**
•
Lighter
•
Stronger

This modern bucket, built of special alloy steel for light weight and strength, answers the call for bucket service that makes real "pay dirt" out of every job. Write for bulletin.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

**WILLIAMS
BUCKETS**

5.5 Miles of Road Poured in 1 Month

(Continued from page 2)

Roadway Maintained for Trucks

The contractor kept the shoulders that were used for a roadway by the batch trucks in good shape with a T-40 McCormick-Deering diesel tractor and a 10-foot Galion leaning wheel blade grader and a T-20 with a Galion 8-foot blade. After the curing was complete a Cletrac 40 with a Rome 10-foot grader and four fresnos and teams completed the shoulders.

Artificial Pond for Water Supply

An airlift pump operated by an Ingersoll-Rand 110-foot compressor was used to keep a small artificial pond filled so that the Jaeger 3-inch 125-gallon pump could supply water to the line along the shoulder. This 2½-inch pipe had valves for the paver every 300 feet, and the paver carried 200 feet of 2-inch hose.

Preparing the Expansion Joints

On this 9-6-9-inch reinforced concrete road the 1-inch expansion joints were placed 78 feet 6 inches on centers with ¾ x 24-inch dowel bars on 1-foot centers, between which were placed dummy contraction joints on 24-foot centers. In order to have the expansion joint steel accurate and to speed the making of the assembly, the contractor made up a heavy wood frame on which the dowels were laid for wiring to the transverse rods. The dowels were first dipped, one end only, in Texaco asphalt and then the metal cap pushed over the dipped end on a measuring board to be sure that they were not pushed snug against the ends. They were then sanded and placed in the frame for assembly.

In making the expansion joints, the lower portion was filled with a mixture of cotton seed hulls, crude oil and asphalt to act as a joint filler and the top surface sealed with OA-55 asphalt.

Personnel

PWC Project 4812, Part 11, A & B, was awarded to Broussard-Warfield Co., of Beaumont, Texas, as the low bidder on all three proposals. The work was carried on under the direction of G. A. Gavin, County Engineer of Brazoria County. C. P. Smith was PWA Engineer-Inspector and Roy Baker was Superintendent for the contractor.

Black Top on Concrete Base Completed Speedily in N.C.

A job consisting of 1,750 cubic yards of excavation, 6,450 square yards of concrete base with a bituminous concrete surfacing was awarded October 3, 1935, and work begun October 4. The contractor, Leon Ellis, used but three days of the allotted forty-five to complete all grading, excavating, underground work and gutters and pour the concrete base. This job, project No. 5342 was 0.27 miles in length on U. S. 70 in Greensboro, N.C.

The concrete work was poured with a 27-E Rex paver and the asphalt plant was started up November 14 to put down the bituminous concrete surfacing and

this was completed November 20. In other words the contract was completed in approximately ten working days out of the forty-five allotted.

Road Machinery News, the interesting news bulletin of E. F. Craven Co., Greensboro, N.C., has this pertinent comment to make. "It seems only fair if there is a penalty for failure to complete a job on contract time, that the contractor who finishes ahead of the contract time deserves some reward—this reward to be not less than the extra cost of engineering and inspecting. The completion of the job ahead of schedule not only saves this but saves the public the cost of detouring."

Flood Gates for TVA Dam Ready for Installation

The first of sixty huge steel flood gates have been delivered at Wheeler Dam on the Tennessee River 16 miles above Wilson Dam at Muscle Shoals. These gates, 40 feet long by 14 feet high, are of radial design and are being assembled

and installed as rapidly as they arrive.

Work on Wheeler Dam is on schedule and the huge structure is expected to be completed during 1936.

Hampered for a time in the delivery of concrete materials because of low water, the work is again proceeding rapidly following a rise in the river.

JAEGER "SURE PRIME"

Means: Fastest
100% Automatic
Prime . . . Bigger
Volume at any
Lift

Our New Catalog Will Show You
How to Cut Your Pumping Costs.

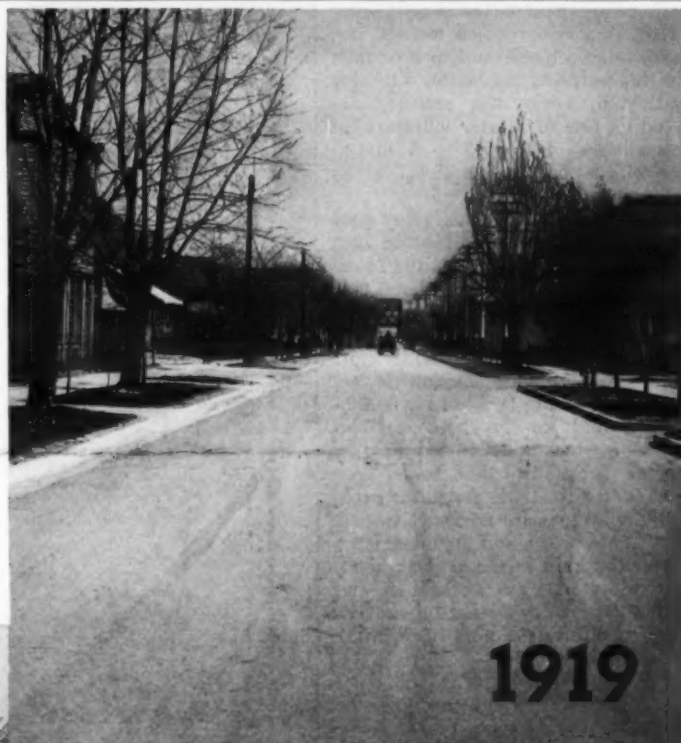


The Jaeger Machine Co., 701 Dublin Avenue, Columbus, Ohio

Before completing your 1936 road plans, talk them over with the Tarvia field man. He has at his disposal all The Barrett Company's 32 years of successful experience in low-cost road construction and maintenance, and offers you practical, unobtrusive, money-saving cooperation. He can show you how to meet immediate and future needs with easy-to-build Tarvia roads—roads that require only the most inexpensive maintenance to keep them smooth, easy-riding and skid-safe for many years. Phone, wire or write our nearest office.

Meet us at Booth F-8 at the Road Show, Cleveland, week of January 20.

THE TECHNICAL SERVICE BUREAU of The Barrett Company invites your consultation with its technically trained staff, without cost or obligation. Address The Technical Service Bureau, The Barrett Company, 40 Rector Street, New York.



1919



1936

Spruce Street, Sault Ste. Marie, Mich. Tarvia-built in 1919. Top photo shows Spruce Street as it looked the year it was built. Lower photo shows the condition of the road last summer—how it will look in 1936.

Barrett
TARVIA
GOOD ROADS AT LOW COST

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PERFORMANCE-ACCESSIBILITY





A Master No. 5 Narrow Section Electric Vibrator

Vibrating Concrete

The use of vibration for concrete has now been recognized by engineers and contractors as a positive means for successfully placing and compacting low water-cement ratio concrete. Proper application of vibration with adequate vibrating equipment makes dense, plastic concrete from mixes which were at one time considered harsh and unworkable.

For this purpose, the Master Vibrator Co., Dayton, Ohio, has recently announced its line of Master vibrators, in diameter sizes of 2½, 3½, 4 and 6 inches, with a power range of ½, 1, 1½ and 2 hp.

Models One to Six have alloy tool steel on the end of the vibrating unit while on Models Seven to Ten the lower casings are also made of alloy tool steel to prevent undue wear. Models One and Two (single phase) are equipped with the Master motor having short circuiting or automatic starting device, which are claimed to be good for 5,000,000 starts and stops. There are two methods of varying the speed or frequency of vibration of these tools. One method is an adjustable generator cycle when the vibrators are operated from a Master generator set, and the other is by means of the built-in motor gear head. Master vibrators are assembled and packed at the factory so that lubrication is required on the job only once in six months.

The wide ranges of types of these vibrators include the highway type, the highway high-speed type, the highway heavy-duty and high-speed heavy-duty types, the narrow section and narrow

section high-speed types, the narrow-section type with built-in motor, the mass concrete medium-duty type, and the ball types for mass concrete and heavy sections. A complete description of these vibrators appears in literature which the Master Vibrator Co., Dayton, Ohio, will be glad to send on request.

New Low-Priced Welder

A new 200-ampere special engine-driven Shield Arc welder has recently been announced by the Lincoln Electric Co., Cleveland, Ohio. This new model, known as the 200-ampere Shield Arc Special, supplies a uniform current for welding with bare or heavily coated shield-arc type electrodes in all sizes up to ¼-inch. The welding current range is from 60 to 250 amperes.

Its generator is the single-operator, variable-voltage type with completely laminated magnetic circuit and equipped with interpoles. The patented Lincoln dual control of welding current is pro-

vided by adjustment of both series and shunt fields. A generator field rheostat and a current regulating switch are mounted in vertical position on a dead-front steel control panel. Electrode and ground cable connections of the wing nut type are also on an easily accessible position.

The welder is powered by a Waukesha 4-cylinder engine which delivers 23-hp at 1,400 rpm, the speed at which the welder is operated. A gear-driven governor maintains proper engine speed at all load conditions. This new low-priced welder is compact and weighs only 1,078 pounds.

New Road Joint Material Is Adhesive, Highly Resilient

Highway engineers have sought for years to develop a highway expansion joint material that would be highly resilient and which would stick to the slabs as they expanded and contracted. Such a material was conceived by a New

York State Division Engineer and is now made by the McCarty Aniline & Extract Co., Inc., 72 Cliff St., New York City.

This cold-poured rubber material, called Sta-Tite, is mixed in any quantity on the job and consists of a pure concentrated rubber latex, a chemical prime powder which dehydrates the latex at normal temperatures, and dry granulated cork. This material does not permanently extrude and recovers its full volume after repeated compressions. Extended 50 per cent of its original volume, it does not break away from the slab ends nor crack.

Sta-Tite has been adopted as an expansion and contraction joint material by: the Port of New York Authority, the Triborough Bridge Authority, and the Transit Commission in New York City; the New York Central Railroad; Nassau County, Long Island, N.Y.; the N.Y. State Department of Public Works for bridges and structures; and by the State Highway Departments of Connecticut and Massachusetts.



Model HP-6, 85 h. p. at 1200 r.p.m., specially equipped with extra heavy steel base, outboard bearing and pulley.

The CUMMINS-DIESEL Portable Power Unit

The proven efficiency of Cummins-Diesels operating under a wide variety of conditions: generating, pumping, driving compressors . . . in fact, every place where continuous steady power is needed, makes these engines the first choice of engineers.

The Cummins model HP-6 is light enough to be easily transported from one job to another despite its high horsepower output. Note the compactness of this power unit. It is free from any superfluous gadgets which might get out of order or require frequent adjustment.

In the Cummins model HP-6 fuel economy plus smooth operation is certain. It is due to the sound mechanical principle of using one low-pressure pump which accurately meters each drop of fuel oil and delivers it to the injectors with unfailing regularity.

Ask your nearest Cummins dealer about the HP-6 power unit, or write direct to the Cummins Engine Company, 600 Wilson Street, Columbus, Indiana.



Ask for "Read the Record," a new booklet just published. It gives the facts.

WELL-POINTED

For a Prosperous
New Year

Results in 1935 prove

BIGGER PROFITS

can be made with

**GRIFFIN
WELLPOINT
SYSTEMS**

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and

Wet Subgrades

THE MODERN WAY

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CUMMINS

INDUSTRIAL • AUTOMOTIVE AND MARINE

DIESELS



Unloading Batch Boxes From the Trailer at the Paver

A Truck and Trailer Unit Hauls Concrete Batch Boxes

On a 10-mile stretch of concrete pavement on U. S. 12 about 10 miles west of Ann Arbor, Mich., Lewis & Frisinger, contractor of Ann Arbor, used truck and trailer units to carry four to six batch boxes each, hauling to the paver. With contracts of the length they are today, industrial railway haulage has suffered a lapse, but these contractors have adapted the same type of batch box to truck and trailer units.

At the construction yard on the Lewis & Frisinger job each truck and trailer unit passed by a loading platform where 564 pounds of cement was first placed in each batch box. Then the unit went to the coarse aggregate hopper where 2,070 pounds of dry gravel were loaded and then to the sand batcher where 1,242 pounds of dry sand and a quantity of calcium chloride was delivered to each box. A Ford V-8 truck and trailer unit hauled six boxes totaling over 11 tons gross. Trucks carrying four boxes hauled about 7¾ tons. With these loads the trucks ran at 40 miles an hour on level ground out to the paver. When the first strip of concrete was being poured, the trucks ran up on the shoulders. As soon as the first strip had cured, the trucks hauled over the new concrete.

Mississippi River Bridge At New Orleans Dedicated

The new Mississippi River Bridge at New Orleans was dedicated and formally opened on December 16, 1935. Named the Huey P. Long Bridge, it is a striking symbol of cooperative achievement. The Southern Pacific Co. urged the building of the bridge and entered into an agreement with the city of New Orleans, through its Public Belt Railroad, to pay train tolls, with a minimum guarantee, thereby furnishing a basis for the financing.

The Louisiana State Highway Commission contracted for the payment of \$7,000,000 of the bridge's cost in return for toll-free highway privileges. Toward the end of 1931, the Reconstruction Finance Corporation agreed to finance the \$13,000,000 needed to complete the bridge, opening the way for actual construction.

The bridge was started in January, 1932, and now stands the longest railroad bridge in the world. It was designed by Ralph Modjeski of Modjeski, Masters & Case, is 4.4 miles long, extends 3,524 feet across the Mississippi River at a height of 135 feet above high water, and is of the cantilever type with eight spans, the longest of which is 790 feet. The height of the central pier from the top of the superstructure to the bottom of the foundation, 170 feet below the water, is 409 feet, the equivalent of a 36-story building.

The West Bank rail approach is 8,680 feet long and the East rail ap-

proach is 8,301 feet long, with 1.25 per cent grades. The West highway approach is 3,378 feet long and the East highway approach is 3,003 feet long,

with 4 per cent grades. An average of 200 workers a month have been employed on this job for three years, while at times as many as 1000 were engaged.

Here's Tunnel Safety

Three and one-half miles of tunnel driven without a single lost time accident is the record for the Pacific Gas & Electric Co. on one of its construction jobs. There was not a single missed hole or mishap in the use of 3,000,000 pounds of dynamite. O. W. Peterson, Engineer of General Construction, outlines the factors responsible for this remarkably fine record, in the News Letter of the Construction Section, National Safety Council. They are:

Management's realization that efficiency and safety go together.

Planning for safety, making Superintendent and Foreman primarily responsible.

Job operations analyzed, and planned, providing proper equipment, etc.

Carefully selected and fit men. First aid training—rule books—instruction in duties—mention of hazards.

Safety Committee—and posting of records.

In 8 miles of new tunnels, half of this distance being with sections 22 feet in diameter with continuous timbering, with an exposure of 500,000 man-days, there were no fatalities.

SYNTRON

Labor Saving
ELECTRIC HAMMERS
ELECTRIC SAWS
CONCRETE VIBRATORS

Write for latest catalog

SYNTRON CO., 601 Lexington Ave., Pittsburgh, Pa.

Note the short tail swing—only 7' 8"—a mighty important factor in any small job and many big ones.

That's what counts in a small-job business. And 1936 is a year of small jobs . . . a home-building, basement-digging year. A job here . . . a job there . . . all over the map. There's real money ahead for the man who's equipped to get to his job fast, dig fast, and hustle on to the next one. That's why so many contractors are buying Bantam-Weights. You can haul 'em half way across town, excavate a basement, and get away to the next job in less time than it takes to get a big, cumbersome machine well started. Bantam-Weights are the fastest things on cats. They're built with new high tensile alloys for lightness and strength . . . they're powered with the husky Ford V-8 motor . . . they're as modern as streamlined trains. If you want to get set for bigger profits from small jobs, take a look at the Bantam-Weight.

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FOR 1936

Heat and Moisture Move Concrete Slabs

Bureau of Public Roads Investigation Covering Stresses and Bending in Standard Test Slabs

THE Division of Tests, U. S. Bureau of Public Roads, has recently reported on the effects of variations in temperature and moisture on the size, shape, and stress resistance of concrete pavement slabs. The tests and observations were made on ten full-sized pavement slabs over periods of time of from one to three years at Arlington, Va.

Observations that have been made may be grouped according to purpose as follows:

1. A study of the extent of the temperature changes that occur in the various parts of concrete pavement slabs.

2. A study of the longitudinal expansion and contraction of pavement slabs caused by temperature changes and changes in moisture content.

3. A study of the resistance offered by the subgrade to horizontal slab displacement and of the stresses developed in the slab by this resistance.

4. A study of the warping of concrete pavement slabs resulting from variations in temperature and of the stress conditions that result from warping.

Following are the conclusions reported by L. W. Teller, Senior Engineer of Tests and Earl C. Sutherland, Associate Highway Engineer, Division of Tests, U. S. Bureau of Public Roads. In comparing the results of these tests with local observations it must be remembered that they were made in the vicinity of Washington, D. C. The temperature and general climatic conditions of that locality therefore must be taken into consideration.

Conclusions

It was found that the average pavement temperature undergoes an annual change of about 80 degrees Fahrenheit. The maximum temperature differentials observed at the edges of the test sections were: 23 degrees Fahrenheit for a 6-inch uniform-thickness section; 33 degrees Fahrenheit for a 9-inch uniform-thickness section; and 33 degrees Fahrenheit for a 9-6-9 thickened-edge section. These maxima occur during the hot afternoons of early summer when the upper surface of the pavement is heated by the intense sunlight and the lower surface is kept cool by a subgrade that is still at a relatively low temperature. In the thickened-edge design the temperature differential in the interior of the slab averaged about 4 degrees Fahrenheit less than that at the thickened edge during the most critical part of the year.

There is a cyclic variation in slab length that is entirely dissociated from temperature changes. The annual variation in the length of the test sections from causes other than temperature changes is approximately equivalent to that caused by a temperature change of 30 degrees Fahrenheit, and the maximum length occurs during the late winter when the ground moisture content is greatest. Conversely, the slab is shortest during the late summer when the ground moisture and, so far as could be determined, the concrete moisture are at a minimum.

The thermal coefficient of expansion of the concrete as determined in the laboratory is 0.0000048 per degree Fahrenheit. This value agrees almost exactly with that determined by measurement of actual temperature expansion in the test sections, indicating: first, that the movement of a pavement slab from thermal expansion can be predicted accurately from laboratory determinations of the thermal coefficient; and second, that in slabs of moderate length the effect of subgrade restraint on slab expansion is so small as to be negligible.

The resistance developed in the subgrade to horizontal slab movement is not merely a matter of sliding friction in the commonly accepted sense of the word. It appears to consist of two elements, one an elastic deformation of the soil horizontally that is present for all displacements of the slab, and the other a frictional resistance that develops only after a certain amount of elastic deformation has occurred. The first element appears to be independent of, while the second varies directly with, the slab weight or thickness. Only one subgrade material was involved in these tests, but it seems probable that the relative importance of the two elements may vary considerably with different types of soils.

In pavement slabs of moderate length the tensile stresses resulting from contraction will not be large for subgrade soils of the type used in these tests. The thicker the pavement the lower will be the unit stress from this cause, other conditions being the same.

The changes in shape of a pavement slab resulting from restrained temperature warping do not cause large changes in the critical stresses from applied loads. In this investigation, the maximum observed condition of upward warping from temperature was found to increase the critical stress resulting from a load by about 5 per cent for a corner loading and about 20 per cent for an edge loading, as compared with the stresses produced by the given load with the slab in the flat or unwarped condition. Maximum downward warping was found to effect a negligible reduction in the load stress at the edge and a reduction of about 20 per cent at the corner.

For standard pavement slabs, such as

used in this investigation, or larger, certain of the stresses arising from restrained temperature warping are equal in importance to those produced by the

heaviest of legal wheel loads. The longitudinal tensile stress in the bottom of the pavement, caused by restrained

(Continued on page 43)



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Steel **BINS**



Concreting plant on a large project.

Build Good Roads for Good Neighbors

(Continued from page 7)

all the roads are deficient in roadbed and drainage.

The northern terminus of the highway would be near La Canoa on the Rio Negro, the boundary at that point between Nicaragua and Honduras, and the southern terminus, a distance of 214 miles, would be near Penas Blancas on the Costa Rica-Nicaragua boundary.

Costa Rica

From there the route of the highway would continue south through San Jose, the capital, to a point on the Panama-Costa Rica boundary line about 6.25 miles northeast of Canas Gordas, a distance of 356 miles. Of this 43.6 miles have already been completed, leaving some 312 miles contemplated construction.

In 1931, Costa Rica had 158 miles of concrete, macadam and rock-surfaced highways and approximately 2,000 miles of earth roads passable only in the dry season. San Jose has 16 miles of concrete paved streets and the streets of the port of Limon are also paved.

Panama

From the Costa Rica-Panama boundary the route would continue to Panama City, the National Palace of which would be the southern terminus of the Inter-American Highway. There is a good road from Panama City to David, a distance of 301.8 miles in which there are ninety steel bridges constructed or provided for. Between David and the Costa Rica line, a distance of about 50 miles, there is only a dirt road, really classed as a trail, which must be constructed into a passable highway.

With the start of the present dry season, work on the remaining section of Panama's part of the Inter-American Highway will proceed under the direction of Tomas Guardia, Chief of the Panama Road Board and also President of the Inter-American Highway.

In 1932, Panama had 900 miles of motor roads, 350 of which were all-season roads and the remainder passable only in the dry season. This however puts Panama considerably ahead of the other Central American countries in the matter of roads. In addition there are about 200 miles of all-season roads in Panama City, Colon and in the Canal Zone.

Our Neighbor to the North

Canada stands second in total road mileage among all countries of the world, with 398,320 miles. In proportion to total miles, Canada shows a relatively higher mileage of surfaced types than the United States, most of which is, however, of the gravel surface types. Of the highway types, there are 2,017 miles of cement concrete, 884 miles of bituminous concrete and sheet asphalt surfaces, and 3,194 miles of surface-treated and penetration macadam.

The Road to Alaska

Carrying on the idea of a truly Pan-American Highway, a commission was appointed in 1930 to cooperate with representatives of Canada in a study of a proposed highway to connect the northwestern part of the United States with British Columbia, Yukon Territory, and Alaska. The proposed route would start at Vancouver, extending north through Prince George, Hazelton and Atlin, in British Columbia, to Dawson, Yukon Territory, and then in a general westerly direction to Fairbanks, Alaska.

The Commission reported favorably on the project, suggesting that the cost for the Alaska section should not exceed \$2,000,000 and for the Canadian section \$12,000,000. The route of the highway from Vancouver to Fairbanks would be 2,204 miles, of which 1,021 miles is now



C. & E. M. Photo

A Typical Bridge Structure on Panama's Section of the Inter-American Highway Between Panama City and David.

in existence, leaving 1,183 miles to be constructed.

Whether or not such a project is carried out will depend on the Canadian Government which seemed to think favorably of it and will probably give it serious consideration as soon as funds are available.

U. S. Leads the World

The United States leads all other nations, both in total mileage and in improved roads. The total U. S. mileage is 3,042,780 of which over 733,000 miles fall within the improved types. In spite of this, there are still some 2,000,000 miles of unimproved roads, or more than thirty times the total improved mileage.

U. S. highway engineers, U. S. road building equipment and the standards and integrity of U. S. contractors have made our roads superior and have set the standards of road construction and maintenance for the rest of the world.

Area and Road Mileage

North America			
Country	Area Square Mile	Road Mileage	Area to Mile of Road
Alaska	590,884	1,701	347.4
Canada	3,681,727	409,124	9.0
Newfoundland	42,734	816	52.3
United States	3,026,789	3,065,254	1.0
Total	7,345,134	3,476,895	2.1
Central America			
British Honduras	8,600	311	7.8
Costa Rica	23,000	360	64.2
Guatemala	42,364	3,491	12.1
Honduras	46,250	611	75.5
Mexico	767,238	56,923	13.5
Nicaragua	49,213	1,134	43.4
Panama & C. Z.	32,388	1,806	32.5
El Salvador	13,176	3,137	4.2
Total	982,249	66,767	14.7

Leech Joins Caterpillar Western Sales Division

W. I. Leech, for many years identified with the sale of construction equipment west of the Rocky Mountains, has joined the Western Sales Division of Caterpillar Tractor Co., Peoria, Ill. Mr. Leech was formerly associated with the American Tractor Equipment Corp., Oakland, Calif., and previous to that covered the Pacific Coast area for LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa.

These two concerns are among the leading manufacturers of earth-moving equipment for use with Caterpillar tractors. Mr. Leech will cover the territory where he is well-known, promoting the

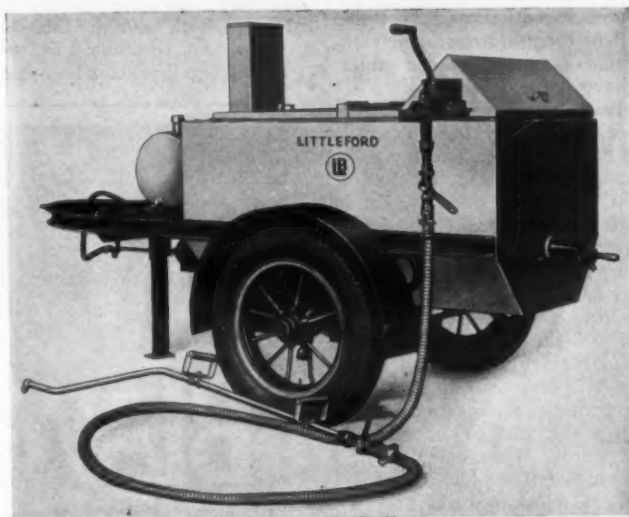
sale of Caterpillar track-type tractors, road machinery and power units in the construction and contracting field.

Picks and Shovels

(Continued from page 1)

place under the African sun" which he now has, it has been reported that an intensive labor-recruiting campaign is being carried on in the Chinchow district of the Kwantung Province of China. Seven thousand coolies are being enlisted for road building in Italian Somaliland, it is asserted. —The Low Bidder

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THE HELTZEL STEEL FORM & IRON COMPANY
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Creosoted Culverts and Bridges

The presence of alkali in the soil and waters of the Timpas Creek Valley between La Junta and Trinidad, Colo., was one of the factors governing a recent decision of the Colorado State Highway Department to use pressure creosoted timber for the larger drainage structures in a road project at that location, reports a recent issue of *Wood Preserving News*.

These structures range in size of opening from 6 x 3-foot 4-inch culverts to standard trestle bridges of 23-foot span. The larger culverts include double sizes of 5 feet 10 inches x 7 feet 4 inches x 42 feet long and 9 feet 4 inches x 10 feet 6 inches x 60 feet long. Many of these culverts were constructed to act both as drainage outlets and as stock passes. All of them are equipped with pile supported wings, and those under light fills have painted hand-rails.

These culverts were built in the field with lumber which had been framed and treated before shipment to the site. The type used is one of laminated construction, in which the side walls are composed of vertical pieces. The individual pieces in the four walls were framed at the ends so as to mortise together when assembled, thus affording mutual support. These pieces have a thickness of 4 inches and a width dependent upon their span and the load supported. All were spiked together horizontally with 60d nails staggered at 12-inch centers and with two 60d nails at each end. Corner fillets, made by the diagonal ripping of 8 x 8-inch timbers, were spiked to adjoining walls in a similar manner. Cut-off walls of 3-inch plank were placed to a depth of 3 or 4 feet below the flow line at each end of the culverts and supported by the corner piles of the wings. The wings are also built of 3-inch plank.

During backfilling operations, it was required that wedged, double diagonal bracing be maintained within the box culverts until the completion of that portion of the work.

There are 17 culverts on this project, containing a total of 278,832 board feet of creosoted lumber and 6,896 feet of creosoted piles. They were designed for the standard H-15 loading and pressure treated with 10 pounds of Grade One creosote per cubic foot. There was also additional treated lumber placed in bridges, guard rail posts and in cattle guards.

This work was carried on under the direction of Paul Bailey, Bridge Engineer for the Colorado State Highway Department, with W. A. Whitney as Resident Engineer.

Device Transfers Load Across Highway Joints

A device to replace the round steel dowel commonly used to transmit loads across transverse joints of both expansion and contraction types in concrete roads has been announced by the J-Bar Co., Chicago, Ill. The J-Bar unit consists primarily of a short dowel bar acting between two anchored and reinforced bearing sleeves. The dowel is made of $\frac{3}{4}$ -inch diameter cold drawn bar steel and the two bearing sleeves are made of certified malleable iron. The dowel is $4\frac{1}{2}$ inches long and fits snugly in the two bearing sleeves so that a close sliding fit is secured. The sleeve castings are cored, drilled and reamed to a clearance of 0.002-inch. The sleeve provides contact for the dowel over a length of $1\frac{1}{2}$ inches and is $3/16$ -inch thick.

The open end of the sleeve casting is strengthened at the point of contact with the joint by means of a $\frac{1}{4}$ -inch circular flange $\frac{3}{8}$ -inch thick. Two bearing lugs,



A J-Bar Assembled

one on each side of the sleeve casting lay in a horizontal plane. The end of the casting away from the face is closed, and an expansion chamber provided, allowing for complete closing of the J-Bar unit without obstruction. This same end is provided with wing anchors spreading away horizontally from the body of the casting a distance of not less than $1\frac{1}{8}$ inches at right angles to the center line or $3\frac{3}{4}$ inches over all and extending back from the face of the slab a distance not less than 4 inches.

This device is practically self-aligning,

clamping firmly against each side of the joint, assuring a more accurate and positive installation without the use of chairs or other supports.

Engine Crankshaft Aided by Use of Roller Bearings

A bulletin discussing the advantages of roller bearings in reducing operating friction on engine crankshafts, simplifying starting in cold weather, and eliminating piston and cylinder wear by assuring accurate crankshaft alignment under load, has just been published by the Timken Roller Bearing Co., Canton, Ohio. This 12-page, $8\frac{1}{2}$ x 11-inch booklet shows typical assemblies for single and double-cylinder gas and diesel engines for both normal and crankcase compression engines. Tables list suggested bearings in several sizes for gas engine pressures of 325 pounds per square inch and cylinder sizes from

$10\frac{1}{2}$ x 12 inches to 16 x 18 inches, semi-diesel units operating at 450 pounds per square inch and having cylinder sizes from $10\frac{1}{2}$ x 13 inches to $13\frac{1}{4}$ x 16 inches and full diesel engines operating at 675 pounds per square inch with cylinders from $9\frac{3}{4}$ x 16 inches to $12\frac{1}{2}$ x 16 inches. Typical closures and bearing adjustments are also illustrated and discussed.

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New developments and improvements in Blaw-Knox Construction Equipment are right in step with today's program.

With a background of years of practical experience, Blaw-Knox equipment is trustworthy. It is economical and low in maintenance. Designed to stand up under severe operating conditions, it is fitted to the job by skilled engineers. It helps immeasurably to fulfill contracts speedily and profitably.

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If it's one of many roadside jobs, Universal portability means easy, cheap moving, quick setup and production "right now."
If it's an unusual project with unusual material there is Universal equipment suited to the job. These features and many more have meant increased popularity and a well deserved recognition of Universal Crushers and equipment.

Let us know your needs and ask for catalog.

UNIVERSAL CRUSHER COMPANY 620 C Avenue, West Cedar Rapids, Iowa

Diesels Play Big Part in Construction Today

(Continued from page 30)

General Construction Co. & J. F. Shea Co., two diesels of the same horsepower; Orino, Bell & Malcom, one diesel of the same horsepower, and Parker & Schram, one diesel 35-horsepower tractor. Among the four firms, four spark-ignition tractors are being used on the project.

Ten diesel tractors, a diesel power unit and eight gasoline tractors form the earth-moving armada at Grafton and Kanawha Dams in West Virginia.

On the Fort Peck Dam in Montana, forty-four diesel tractors, most of them of 75-horsepower, eight diesel power units and two diesel Auto Patrols are included in the total of 120 tractors busy on this great earth-moving assignment, the survey shows.

Why So Many Diesels?

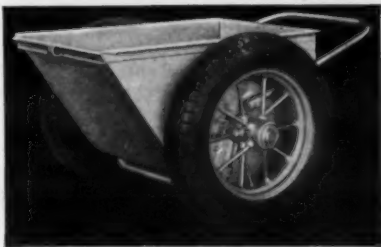
What is the reason for this swing? The dam builders have the answer: more power when more power is needed, unprecedented economy, simplicity and precision in principle and design that means a tractor moving dirt when dirt needs moving. The big excavation programs east and west, north and south, from the All-American Canal and the Metropolitan aqueduct in the west, at the Sutherland reservoir in Nebraska, and to the Skyline highway in the east, are being handled by veterans who saw the value of being diesel-wise. On the big jobs, where aggregate, earth and concrete are moved in millions of yards, where magnitude of the tasks means hundreds of new problems, the diesel is going in increasing numbers to help face and solve the issues.

Arc Welding Machine Towed Cross Country

A three-months jaunt around the country, towed behind a truck, is the record of a Wilson gas-engine-driven 300-ampere arc welder mounted on a rubber-tired truck trailer. It was towed 10,000 miles in every state east of the Rockies except Minnesota and over every kind of road imaginable. Some of the roads were so bad that the highest speed possible was 6 to 8 miles an hour. The elements as well as the roads imposed a terrific test on the machine. Rain for a week at a time, snow, sleet, dust storms and temperatures that varied from 86 to 4 degrees below.

The machine was exhibited at 65 different shows in charge of fourteen different men. At each show from 50 to 150 men used the machine with every type of rod carried by the Air Reduction Sales Co., and practically each man changed the voltage and amperage in rapid succession.

Fred J. Maeurer reports, "The machine has taken a terrible beating on this trip . . . and has always been in perfect operating condition. Since we left on this tour, the only expense we have had was the gasoline and oil. We have not spent one cent for maintenance repairs."



The New CMC Material Cart

Two New Material Carts

Included in the line of wheelbarrows and material carts recently added to the line of contractors' equipment made by the Construction Machinery Co., 500 Glenwood St., Waterloo, Iowa, are two new sizes of carts. The No. 9 holds 9 cubic feet and is especially adaptable for handling bulk cement. The other cart, No. 11, has a capacity of 11 cubic feet and will take the regular batch from a 10-S mixer.

Both models are offered with balloon

pneumatic-tired roller-bearing wheels as well as regular steel-tired wheels. The rubber-tired wheels are of the drop center rim type, using standard 18 x 5.25-inch tires.

These new CMC carts are constructed of first quality full-gage steel, electric welded and reinforced. The axle, which is heavy enough to stand up under severe service, passes beneath rather than through the hopper.

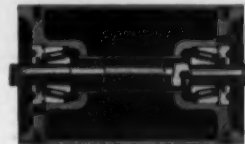
Complete information on these carts may be secured direct from the Construction Machinery Co.

New Vibrator Used at Expansion Joints

A 3-horsepower gas-engine concrete vibrator with wheelbarrow mounting and a pneumatic-tired wheel has been announced by the Mall Tool Co., 7740 So. Chicago Ave., Chicago, Ill. This vibrator is designed for use around expansion joints and at the edges of concrete pavement. The wheelbarrow

mounting provides unusual portability.

The gas engine power unit delivers vibration frequencies varying from 2,000 to 4,500 per minute complying with practically all specifications for the vibration of concrete in pavement. This outfit is furnished with 14, 21 or 28 feet of shafting.



Adjustable bearings locked into pulleys take radial and thrust loads. Furnished with either Ball or Roller Bearings.


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VICTOR H. ALLING, MGR.
FORMERLY OF THE VANDERBILT HOTEL



The Pioneer Portable Mixing Plant for Stabilized Road Construction

Portable Mixing Unit for Stabilized Roads

There is increasing interest in the construction of stabilized gravel-clay roads composed of a mixture of gravel, sand, clay and calcium chloride in proper proportions. Most roads of this type have been built by the road-mix method but this lacks accurate control of the amount of ingredients. A portable stabilizer plant for mixing the material at any convenient gravel pit has been announced by Pioneer Gravel Equipment Mfg. Co., 1511 Central Ave., Minneapolis, Minn. This plant is a one unit outfit and, except for the conveyor, is mounted on a four-wheel all-steel truck. The plant consists of a clay feeder, belt conveyor, clay shredder, roll crusher if necessary, pugmill, calcium chloride hopper and feeder, and a delivery conveyor. The gravel is crushed and screened in a separate plant and is delivered directly into the pugmill.

The clay is dumped through a trap onto a special type feeder which governs the amount of clay fed to the plant. A belt conveyor delivers the clay to the shredder which tears up the chunks. A roll crusher can be used if necessary to crush rocks and flatten out the clay. The clay is then dropped into the pugmill with the gravel.

Calcium chloride is fed from a hopper on top of the plant through an automatic, adjustable feeder which controls the rate. Water is added as may be necessary in order to get the desired moisture content. The pugmill thoroughly mixes and blends the ingredients and deposits the stabilized gravel on a belt conveyor for delivery to trucks or bins.

The mixed material may then be delivered directly onto the prepared grade and requires only spreading and rolling in order to make a finished stabilized wearing course.

A Train Load of Buckets For Use at Grand Coulee

A train load of forty Blaw-Knox roller gate concrete buckets was recently shipped from Pittsburgh to the Mason-Walah-Atkinson-Kier Co., for use on the Grand Coulee Dam job in the State of Washington. These buckets have a rated capacity of 4 cubic yards each handling low-slump mass concrete. They weigh approximately 4,100 pounds each.

In operation special cars carry five buckets each. The buckets are loaded at the mixing plant, then transferred by dinky locomotives over a trestle where Whirley cranes pick up the buckets and lower them into position for dumping in the forms. These buckets are of the frictionless roller gate type, designed with sufficiently steep sides, walls and large openings for handling concrete as stiff as 1 1/4-inch slump.

Rules for Concreting During Cold Weather

A number of simple and fundamental rules for winter concreting are set forth by the Portland Cement Association.

At temperatures of 40 degrees F. and lower, or when temperatures may drop below that point within 24 hours after concrete is placed, mixing water and aggregates should be heated, and freshly placed concrete adequately protected.

When heating is necessary, concrete should have a temperature of between 70 and 100 degrees F., when placed, which should be maintained at from 50 to 80 degrees or higher for a period of not less than four days. Protection should be placed immediately after pouring the concrete.

Artificial heat within enclosures should be continuous and reasonably uniform, and exposed concrete surfaces should be wet down once every 24 hours throughout the heating period.

Aggregates containing frozen lumps should be heated independently, and no materials containing frozen lumps, ice or snow should enter the mixer. Never pave on frozen subgrades, or place concrete in forms in which there is snow or ice.

Do not remove forms until the concrete has sufficient strength to sustain its own weight plus any temporary or

permanent load that may be placed upon it.

Complete specifications for winter concreting may be secured from the Portland Cement Association, 33 W. Grand Ave., Chicago, Ill.

The Hawkesbury Bridge at New South Wales, Australia, long held the world's record for pier depth, 162 feet. Then came the New Orleans piers at 185-foot depth but the piers for the San Francisco-Oakland Bay Bridge, reaching a maximum depth of 240.7 feet in the West Bay Channel and 242 feet in the East Bay Channel, exceed the maximum depth of the piers for the Hawkesbury Bridge by 50 per cent.

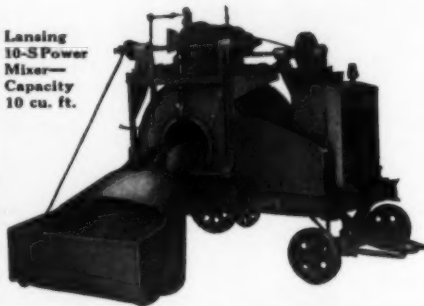
Compilation of Standards on Preservative Coatings

The American Society for Testing Materials has recently issued the second edition of its compilation of A.S.T.M. Standards on protective coatings, other than metallic coatings, thus bringing together in convenient form all of the 101 specifications, test methods and definitions which have been developed through the work of the Society's Committee D-1.

Copies of this compilation, comprising 387 pages, may be secured from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Pa. Price: \$1.75.

Lick Cost and Time Factors with LANSING Equipment

Lansing 10-SPower Mixer—Capacity 10 cu. ft.



Lansing Pneumatic Tired Barrow



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3 1/2-T Lansing Trailer Mixer—Fast Trailing—Fast Mixing

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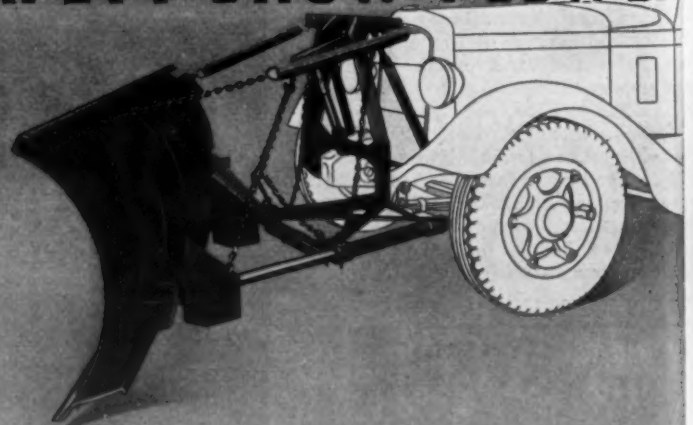
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INVEST in Gettelman "HEIL QUALITY BUILT" blade and "V" type snow plows . . . Scientifically designed to clear snow away with minimum pushing effort . . . operated by hand hydraulic cab control . . . Easily attached and detached . . . Send for complete catalog of Heil Quality Built Products . . . Address: The Heil Co., 3000 W. Montana Street, Milwaukee.

Cotton Reinforces Bituminous Roads

Specifications Offered by South Carolina As Result of Nine Years Study and Experiment

SOUTH Carolina has been pioneering in the field of investigation of the use of cotton fabric membrane for reinforcing bituminous surfaces. These experiments which began in 1926 and have covered a wide field of activity have resulted in a standard set of specifications dated October 1, 1935.

The experimental work was not confined to roads which were in good condition but to old bituminous-treated roads that have cracked and failed and even some of the experimental work was not entirely successful, but each has led definitely to conclusions regarding the weight and type of fabric to be used and its method of application.

Sweeping the Surface

The prepared grade for the roadway must be swept thoroughly with revolving brooms or some type of mechanical sweepers, supplemented by hand brooms and mechanical blowers. It is necessary to remove all dust and loose material from depressions and the outer edges of the strip should receive particular attention until all dust and loose dirt are removed from the entire strip.

Applying Bituminous Material

Bituminous material should not be applied to a wet surface nor when the temperature of the air is below 50 degrees Fahrenheit in the shade. The South Carolina specifications do permit the application of a cut-back asphalt seal coat with temperatures as low as 40 degrees. Pressure distributors are recommended for applying all bituminous materials, using pressures from 15 to 30 pounds per square inch.

The spacing of the distributor nozzles is uniform except that the first and second nozzle at each end are required to be not more than one-half the interior nozzle spacing. In applying the prime, the end nozzle is set at right angles to the center line of the road, and parallel to the center line of the road when applying hot asphalt or seal.

The Prime Coat

The tar for the prime coat is heated to a temperature not greater than 150 degrees Fahrenheit and is applied at a temperature of not less than 125 de-

grees. It is not applied until the base course has been compacted and bonded under traffic and when compact, dry and swept clean. The engineer is permitted to approve the application of the prime when the base course is slightly damp but when there is no free moisture showing on the surface provided it is firm enough to show no appreciable deformation under the rear tires of a loaded distributor.

Traffic is kept off the road after the prime is applied until the tar has penetrated and dried out so that it will not pick up under traffic. When it is impracticable to detour highway traffic, the contractor is permitted to spread the minimum amount of cover material necessary to avoid picking up. The tar prime is usually applied in a uniform rate of 0.3-gallon per square yard minimum to 0.35-gallon maximum.

The contractor is required to maintain the prime coat intact until it is covered by the hot asphalt. Where the prime coat fails because of disintegration of the underlying base, the spots are cleaned out, slightly scarified, dampened, refilled with selected material similar to that used in the adjacent parts of the road and then tamped. Spots are primed, using a hand hose equipped with a nozzle or with a hand-pouring pot. If the engineer decides that the addition of new material is not necessary, the prime coat is merely re-applied after thorough sweeping and the depression filled with fine or coarse aggregate to bring it to grade.

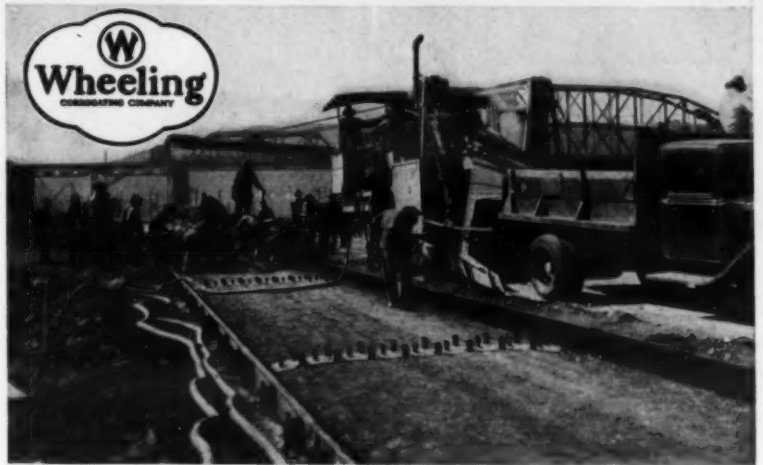
Covering of Cotton Fabric

After the prime coat has dried, it is covered with a cotton fabric weighing approximately 4.25 ounces per square yard, with 12 to 17 threads per inch in both warp and filling and with a minimum breaking strength of 28 pounds in the warp and 24 pounds in the filling when tested by standard A.S.T.M. methods. The fabric is spread longitudinally and tacked down with the strips overlapping at least 2 inches. The width of the strips must be one-third or one-fourth the width of the proposed surfacing plus 2 inches.

Fabric Coated with Hot Asphalt

After the surface has been completely covered with the cotton fabric, an application of hot asphalt is made with a pressure distributor at the rate of 0.5 to 0.55 gallons per square yard. A 150-200 penetration asphalt is used, heated not higher than 375 degrees Fahrenheit and applied at a temperature of not less than 300 degrees Fahrenheit. It is applied only when the prime coat is firm and intact and when the surface of the prime coat is free from any signs of moisture and the temperature of the

(Continued on page 44)



WHEELING DOWEL BAR SUPPORT

(PATENTS APPLIED FOR)

FOR TRANSVERSE JOINTS OF CEMENT HIGHWAYS

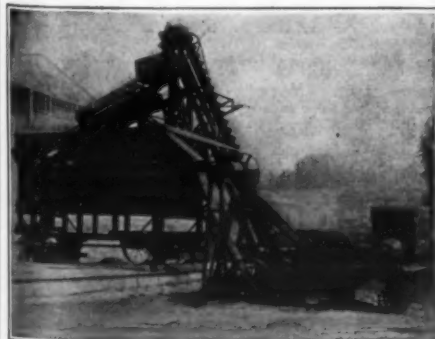
A new and improved method for installing expansion and contraction transverse joints quickly and economically, insuring all the elements of the joints remaining in correct position. Difficulty in placing dowel and joint is entirely eliminated. No stakes to drive. One man keeps ahead of the work with every joint in correctly. All delays eliminated. See this Wheeling development at the Road Show.



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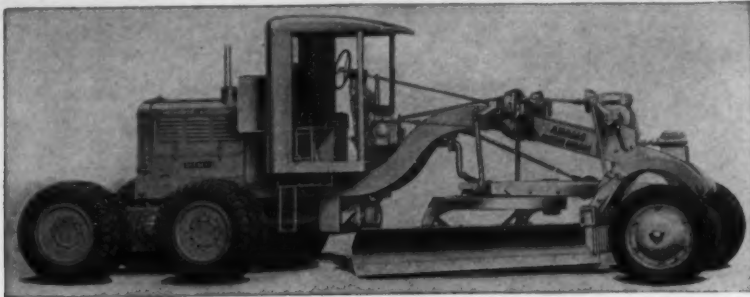
producing small or large sizes—
from one-man stone—in one
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"Good Roads" Plants are built to
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fication and capacities.



The Adams Model 51 Diesel-Powered Motor Grader

New Heavy-Duty Graders With Gas or Diesel Power

Two new heavy-duty motor graders No. 50 and 51 will be displayed by the J. D. Adams Co., Indianapolis, Ind., for the first time at the A. R. B. A. Road Show in Cleveland this month. These new machines are identical except for the power units. No. 50 is powered by an International 6-cylinder gas engine developing 59 horsepower and Model 51 is powered by the International diesel engine developing 57 horsepower.

The frame and drawbar design is all-welded, box-type construction claimed to afford extraordinary strength and rigidity but improving the visibility of the blade and permitting a wider range of blade adjustment. The new machines have five forward speeds, each of which is variable by a governor control so that practically any speed can be obtained from 1 to 15 miles an hour. Either machine may be equipped with 12, 14 or 16-foot blades, with or without scarifier, and with dual-tired, two-wheel drive on the rear, or tandem drive with four or eight-drive wheels.

New Convertible Shovel

A new 2 1/4-yard convertible shovel, dragline and crane equipped to give greater yardage with less up-keep and lower fuel consumption will be featured by the Lima Locomotive Works, Inc., Crane and Shovel Division, Lima, Ohio, at its Cleveland Road Show exhibit.

The rotating frame is a one-piece steel casting carrying the supports for the drum shafts. The drums are extra large in diameter and wide enough to carry the maximum amount of cable without double wrapping when the machine is operating as a crane or on high-lift work.

It is equipped with interior expanding power-set clutches and oversize brakes. Roller bearings are used at every vital bearing point and helical cut gears are used throughout. All major motions are independent, making it possible to hoist, swing, travel and raise or lower the boom at the same time. The control levers are mounted on square shafts for positive response.

The machine is steered from the operator's position with the cab in any position. The crawler truck is the large open-roller type and is chain-driven. The crawlers are designed so that they can be extended in length when greater bearing surface is desired, the change being made in the field. The boom and dipper handle are of box-type design and electrically-welded. The dipper is cast in one piece of manganese steel with detachable lip. This Type 901 Lima shovel comes equipped with oil, diesel or electric power.

United Machinery Company Now Ramsey Machinery Co.

The United Machinery Co., Portland, Ore., has announced the change of its name from United to Ramsey Machinery Co. in order to promote the name by which its products are known. This company, located at 1626 N. W. Thurman Street, Portland, Ore., manufactures the Ramsey 3-speed hand winch and the Ramsey power hoist.

Mann Promoted by Truscon

Truscon Steel Co., Youngstown, Ohio, has announced the appointment of Kenneth D. Mann as Executive Vice President. Mr. Mann formerly was Southern District Sales Manager of Republic Steel Corp., with headquarters in Birmingham, Ala.

New Oil-Resisting Air Hose

A pneumatic hose, designed to overcome the deterioration caused by hot oil from air compressors and having great resistance to heat, high pressures and the cutting effect of sharp rock and exposure to sun and weather, has been announced by The Republic Rubber Co., Youngstown, Ohio. The tube is made from a compound similar to that used in oil conducting hose and can actually be saturated with oil for long periods without affecting its serviceability.

Strength is obtained, without impairing flexibility, by constructing the plies from a specially twisted cord which is thoroughly impregnated with a new tenacious rubber compound. This also increases the bursting and working pressures, and gives strength without excess bulk or useless weight. It is recommended for use in mines, quarries, rock industries, road work, contracting and

generally where service is exceptionally severe.

NO SHUTDOWNS with a HOBART

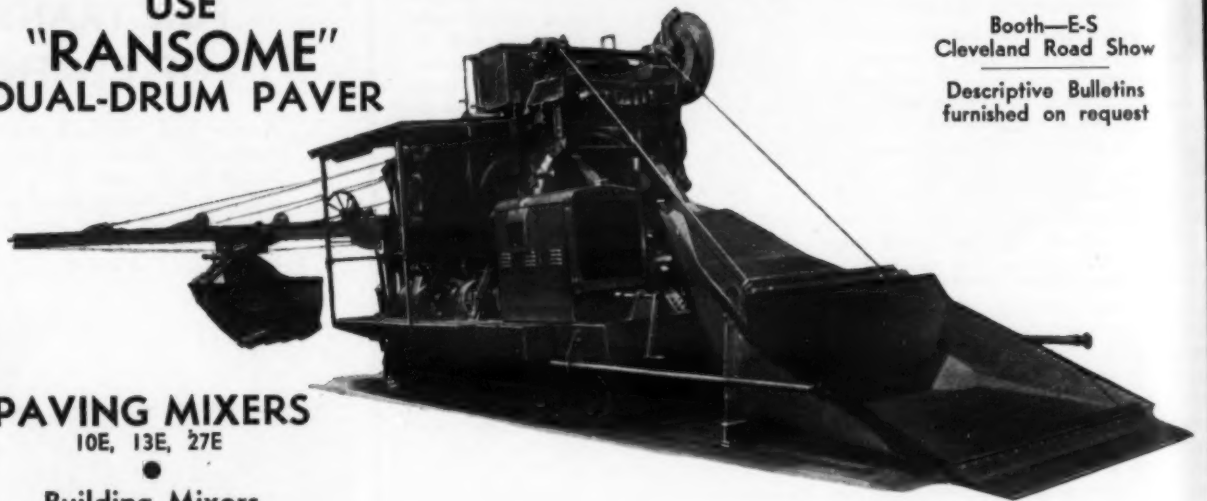
The New Hobart Engine Drive Arc Welder

No longer need broken equipment hold up your jobs—the Hobart Engine Drive Arc Welder will let you handle repairs in short order—it is big enough to handle your steel construction work. Ask for your copy of "The Many Profitable Uses of Simplified Arc Welding." No obligation.

HOBART BROS.
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CUT YOUR MIXING TIME IN HALF— USE "RANSOME" DUAL-DRUM PAVER



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DUNELLEN NEW JERSEY

NEW ECONOMY in Spreading and Finishing!!

With the
**Know More About
This Simple, Low
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BLAW-KNOX Road FINISH SPREADER

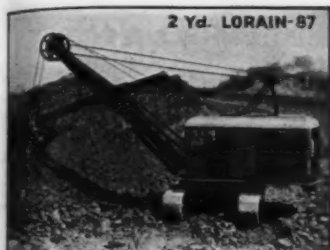


The Blaw-Knox ROAD FINISH-SPREADER will spread and finish stone or gravel; hot or cold asphalt—one to fifteen feet wide—half a road at a time. Will lay varying widths on curves fully or partially banked—with one machine at a fraction of the usual cost.

Ask Blaw-Knox to send you Catalog No. 1523—"The Blaw-Knox Road Finish-Spreader."



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2067 Farmers Bank Bldg., Pittsburgh, Pa.
Offices and Representatives in
Principal Cities



2 Yd. LORAIN-87



1 Yd. LORAIN-55D

3/4 Yd. LORAIN-40
TRUCK SHOVEL

Thew's New Trio

Three New Shovels Announced by Thew

A 3/4-yard truck shovel, and new 1-yard and 2-yard shovels have been announced by the Thew Shovel Co., Lorain, Ohio, and are to be exhibited at the A.R.B.A. Road Show in Cleveland this month.

The 2-yard Lorain-87 built around the Thew center drive is equipped with a 24-foot boom which is virtually two booms in one, a structural member that absorbs all bending and compression forces and a tubular, torsional member that absorbs and resists all boom twisting and torsional stresses. Each is independently connected to the shipper shaft and to the boom hinges so that each is called upon to absorb only those stresses for which it is designed. The 18-foot dipper stick on this model is made of seamless tubing, a section providing the greatest bending and torsional resistance per linear foot of weight. The hoist, swing, and crowd or travel shafts are mounted on Timken roller bearings as are the swing drums.

The new 1-yard diesel Lorain-55D is built with a longer turntable, has a 19-foot shovel boom and is mounted on

a heavier crawler, 12 feet 3 inches long. It is powered by a 4-cylinder diesel engine. Its crane capacity is 15 tons at 12-foot radius.

The 3/4-yard Lorain-40 truck-shovel unit is mounted on an Indiana truck of the three-axle type with ten pneumatic tires. This capacity in a truck-shovel is a new idea and brings to the field of highly mobile equipment a unit built to do a real job.

Concrete Slabs Move From Heat and Moisture

(Continued from page 36)

temperature warping, frequently amounts to as much as 350 pounds per square inch at certain periods of the year and the corresponding stress in the transverse direction is approximately 125 pounds per square inch. These stresses are additive to those produced by wheel loads.

In long or even moderately long pavement slabs, when conditions are such as to produce large temperature differentials, thickening the edge of the slab may actually decrease the load-carrying capacity of this part of the pavement. In very short pavement slabs, thickening the edge of the slab may be expected to increase definitely its load-carrying capacity.

Since the critical stresses resulting from restrained warping are opposite in sense to those caused by applied loads in the corner region of a pavement, thickening the edge of the slab may be expected to increase the load-carrying capacity of the slab corner. Because of the facts stated in the paragraph preceding and in this one, it is evident that thickening the edge of a long pavement slab will not tend to reduce transverse cracking but will tend to reduce corner cracking.

The annual cyclic variation in moisture conditions within the concrete produces a warping of the slab surface similar to that caused by temperature. The edges of the slab reach their maximum position of upward warping from this cause during the summer and the maximum position of downward warping during the winter, the extent of the upward movement apparently exceeding that of the downward movement considerably.

Washtenaw County Reports Value of Stabilized Roads

Stabilization of gravel roads by the addition of binder soil and calcium chloride not only greatly decreases maintenance operations but also provides excellent base for higher type surfacing, according to the annual report of the Washtenaw, Mich., Board of County

Road Commissioners for 1935. The report specifically cites the experience with one section of a clay-calcium-treated road which went for a period of eight weeks during the summer without requiring grading or any maintenance whatever, even though there were frequent rains. The report also states that most "black-top" failures are due to inadequate base, and that stabilization has provided an excellent and economical base on which to lay this type of surface.

PNEUMATIC
TIRES
TIMKEN
BEARINGSNON-TILTERS
75 to 56S SizesTILTERS
3 1/2 S-5S-7S

LATEST TYPE
SPEED KING

10S
BRIDGE
BUILDER

Now Faster Than
Ever, On the Road
and On the Job!

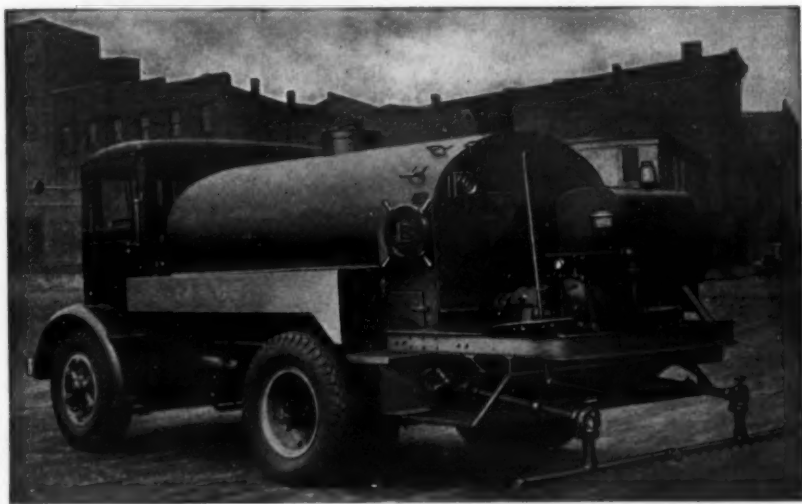
Send for New Catalog of High
Speed Mixers—3 1/2 S to 56S Sizes

THE JAEGER MACHINE CO.
701 Dublin Avenue, Columbus, Ohio

See The LAST WORD in PRESSURE DISTRIBUTORS

AT BOOTH E-7 AT A.R.B.A. SHOW
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Look over the Littleford Model "C"
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RAPID HEATING
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These salient features and many others will be shown and explained to you. Work the levers—turn the Control Hand-Wheel—you'll be amazed at its simplicity. Then take the new Bulletin L-14 home with you—to explain every detail again.



LITTLEFORD
Road Maintenance Equipment
SINCE 1900

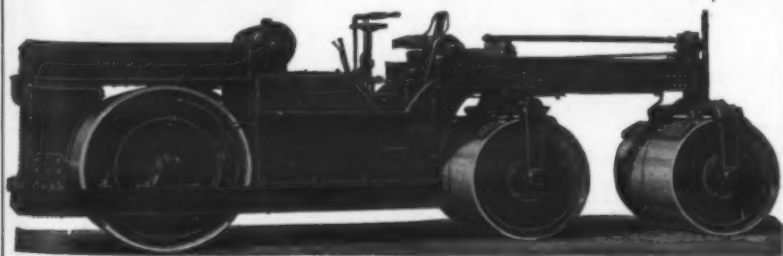
LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

Two events of importance to road builders:

The biggest Road Show of them all, and
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THE NEW THREE AXLE BUFFALO-SPRINGFIELD ROLLER

This new Roller's triple action means multiple compaction of bituminous and other surfacing materials, either hot or cold, at all times. Drop in at our Booth No. F-22 at the Road Show, or, if this is impossible, write us for a copy of the illustrated pamphlet describing this new money-saving piece of equipment.



THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

Cotton Reinforcing for Bituminous Roads

(Continued from page 41)

air is not below 50 degrees Fahrenheit in the shade.

Coarse Aggregate Spread and Rolled

As soon as the hot asphalt is applied on the fabric, it is covered uniformly with from 45 to 47 pounds of coarse aggregate per square yard. If the temperature is 60 degrees or above, the coarse aggregate may contain as much moisture as is ordinarily the case when it is washed at the quarry, but air drying is required when the temperature is below 70 degrees. Spreading is done directly from trucks with approved mechanical spreaders, the trucks driving on the covered asphalt.

If it is impossible to detour highway traffic, the hot asphalt is applied to only one-half of the road at a time and the coarse aggregate spread within 8 inches of the edge of the application along the center of the road until the hot asphalt has been applied to the remaining half of the road. The coarse aggregate is spread as quickly as possible after the hot asphalt has been applied and at all times within one distributor load of where the asphalt is applied.

As soon as the coarse aggregate has been spread, two or more men with hand brooms go over it, brooming off the high spots where the aggregate is too thick or a non-revolving broom drag is pulled over the road by a truck. Following this, the coarse aggregate is rolled with a power roller of 5 to 8 tons weight, working in a longitudinal direction beginning at the outer edges of the treatment and working toward the center with each strip overlapping by at least one-half the width of the roller. The first rolling of the coarse aggregate should be done within one half hour after the application of the hot asphalt and is continued until the coarse aggregate is thoroughly keyed into the asphalt. Highway traffic is allowed on the road as soon as the coarse aggregate has been spread but should be distributed over the entire road surface by means of suitable barricades. After the coarse aggregate has become sufficiently embedded in the bitumen, all excess is broomed from the surface.

Seal Coat

Immediately before the application of the cut-back asphalt seal coat, the surfacing is thoroughly swept to remove any loose material. The cut-back asphalt from the tank car is only heated slightly so that there will be no material change in viscosity. It is applied only when the surface is clean, firm and intact and free from any signs of moisture. The total quantity of cut-back asphalt required per square yard is: with broken stone used for both fine and coarse aggregate, 0.3 to 0.35-gallon; with broken slag used for both coarse and fine aggregate, 0.36 to 0.41-gallon; with broken slag used as either coarse or fine aggregate and broken stone as the other aggregate, 0.34 to 0.39-gallon.

The cut-back is distributed in two applications each about half the total quantity. The first application is made before the fine aggregate is spread and the second application immediately after the fine aggregate. The first application of cut-back asphalt is held to within one distributor load of the distance of the second application of cut-back.

The fine aggregate averaging 16 to 18 pounds per square yard is spread immediately after the first application of the cut-back asphalt using mechanical spreaders attached to trucks. As soon after the fine aggregate is spread as possible, the second application of cut-back asphalt is made, followed by dragging with a non-revolving broom drag

until the seal coat is thoroughly mixed, uniformly distributed and has set up sufficiently so that continued dragging would not materially improve the riding qualities of the completed bituminous surfacing. It is then rolled with a 5 to 8-ton roller in a similar manner to

the rolling of the coarse aggregate.

During the period of two or three days when the dragging and rolling are in process, all traffic is detoured. The road is not opened to traffic until the seal coat has cured sufficiently to prevent "picking up."

Distributors Directory

will appear every other month during 1936. The next insertion, in the February issue, will contain many important changes in the lines carried.

Before Buying Your Trailer

INVESTIGATE the Money-Saving Features of The La Crosse All Purpose Trailer

- Low Operating Cost
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Capacities
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Metal Accessories for Highway Construction

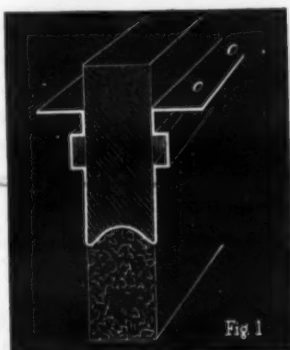


FIG. 1

illustrates the metal housing for the fibrated asphaltic joint showing control of oozing of upper structure. The base is prepared from a non-oozing material.

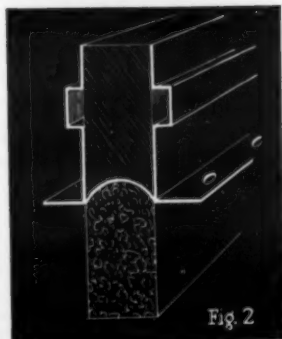


Fig. 2

FIG. 2

illustrates a fibrated asphalt top showing metal escape containers with a fibrated asphaltic top and a sponge-rubber, cork-rubber or fibre board base. The structure has an intermediate seal.

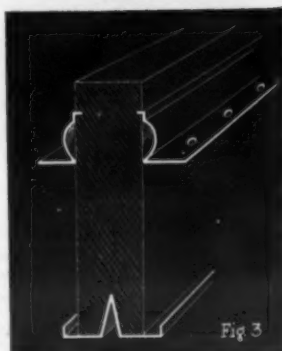


Fig. 3

FIG. 3

illustrates a combination seal imbedded in fibrated asphaltic top and the escape apertures as well as the seal absolutely controls the fibrated asphalt flow. The base has a copper seal.

FIG. 4

illustrates an extruded fibre mastic product provided with grooves for the metal accessories used in connection with flow control. Escape dowel locks and supports and upper escape and seal combination control oozing tendencies in this joint. The metal forms contribute to the rigidity of the joint and afford a simple economical means toward a positive seal. The means of properly housing the dowel bars so as to hold the dowel bar in rigid position while the concrete is being poured is effective and certain.

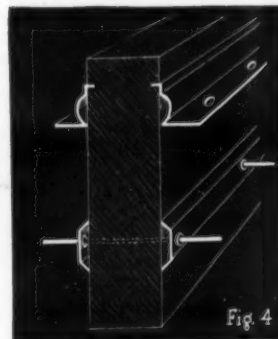


Fig. 4

FIG. 5

illustrates an upper seal which can be utilized with a backing board or with a prepared joint filler in which the joint may be poured or filled and a positive seal formed thereover. 5a-5b departures from 5.

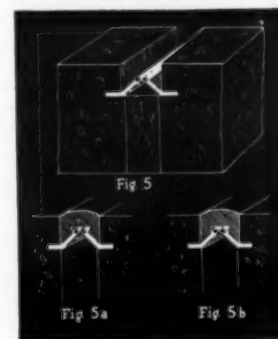


Fig. 5

Fig. 5a

Fig. 5b

FIG. 6

illustrates a separate metal housing seal.

FIG. 7

illustrates a metal form for the base seal.

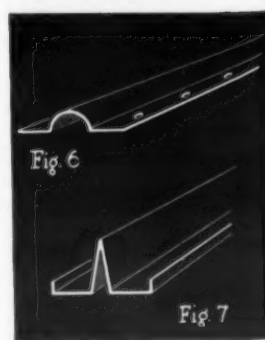


Fig. 6

Fig. 7

NOTE: All the benefits of a metal cushion joint are obtained and in addition a waterproof filler and seal with greater flexibility at lower cost.

In conjunction with the above, we furnish extruded fibrated asphalt material with the fibre content in greater relation to the asphalt content so as to furnish some resiliency. This material comes grooved with a suitable affixing of dowel supports and escape cushions.

We also furnish extruded sections such as curb cushions; bridge plank, mineral surfaced, standard and ribbed; and our metal accessories in conjunction with highway and bridge construction.

We specialize in extruded forms to meet various engineers needs.

SERVICISED PRODUCTS CORP., 6051 W. 65th St., Chicago



The New End-Discharge 14-S Concrete Mixer

New 14-S Concrete Mixer Has Weight Reduced

A new 14-S end-discharge mixer patterned after its 10-S Silverstreak has been announced by the Construction Machinery Co., 500 Glenwood St., Waterloo, Iowa. The use of a special abrasion-resisting steel and other alloys enables the manufacturer to reduce the weight of the new 14-S to little more than that of the 10-S. Because this steel is eight times as resistant to wear, blades, buckets, discharge chute liner and the drum shell itself, while lighter, will last much longer, according to the manufacturer.

The unit is readily portable with automotive steering, roller bearing wheels, full spring mounting, and short wheel base. The mixing drum has end to end mixing action with the blades and buckets elevated from the drum to make it self cleaning. The streamline charging skip has a new type bumper or shaker to speed charging.

First Display of New Trucks by White at ARBA Road Show

The latest models of White and Indiana trucks, specially designed for road building and general construction projects in 1936, will be displayed by the White Motor Co., for the first time at the Annual Convention and Road Show of the American Road Builders' Association in Cleveland, January 20-25. These trucks cover the range of road and general construction needs from the lightest units to the heaviest tractor-trailer jobs. These lines include not only the lower priced series of light assembled trucks, but four-wheel-drive models, six-wheel units with four-wheel-drive, and large six-wheel trucks with six-wheel drive.

Delegates to the Convention are invited to visit the White factory, traveling from the Cleveland Auditorium to the White factory in busses.

Design and Construction of Welded Steel Bridges

The forthcoming Bridge Specification of the American Welding Society will cover welding in design, construction and repair of highway and railroad bridges. It will prescribe unit stresses varying with the range of stresses in a manner similar to those adopted in one or two European countries but expressed much more simply and in a manner that will lend itself readily to amendment when American fatigue testing produces more dependable data.

Although the use of welding in the construction of bridges dates back to 1922, it was realized by the committee that some pioneer work, including a study and digest of recent literature and test reports, had to be done before suitable specifications could be prepared. Because of its volume, the work was divided by P. G. Land, Jr., Engineer of Bridges, Baltimore & Ohio Railroad and Chairman of the Committee, among

various subcommittees. Within a short space of time an extraordinary amount of information was collected and digested, enabling the subcommittees to offer specific recommendations to the main Committee. A three-day session of the main Committee was held recently in New York where the subcommittees reports were correlated and turned over to an editorial committee.

Truck Sales to Uncle Sam

The War Department has placed an order for seventy-four trucks, cabs and bodies with the Federal Motor Truck Co., Detroit, Mich. Upon completion of this order, Federal will have furnished to the War Department and to other branches of the United States Government more than one million dollars worth of motor vehicles during the past twelve months.

The latest fleet of trucks which Federal will build for the War Department will be equipped with bodies built to

government specifications. Sixty-six of the trucks will be equipped with enclosed driver's cabs, 9-foot dump bodies and hydraulic hoists. The remainder will also have enclosed cabs but will be equipped with army cargo-type bodies, fitted with tarpaulin tops and troop seats.

Thimble Same on Both Ends of New Wire Rope Sling

The same size thimble is used on both ends of the wire rope slings now being made by the Macwhyte Co., Kenosha, Wis., yet either thimble passes freely through the other making it possible to use the same sling for both choker and basket hitches. This new thimble design, for which patent application has been made, steps up production by making loads easier to handle, and also gives longer life to slings used on choker hitches. Either end of the sling may be attached to the crane hook and by using first one and then the



The New Macwhyte Thimbles Pass Through Each Other

other, two wearing points in the body of the sling are provided. When two sizes of thimbles are required, there can be only one wearing point.

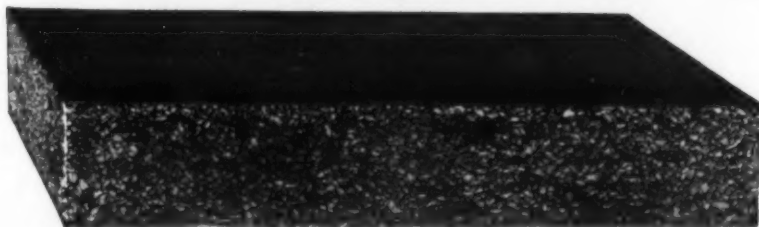
Another feature of these new thimbles is the fact that there is no seizing to cover up the rope in the thimble. Inspection is made easy at all times. This special type of thimble is supplied on braided body slings made from endless wire ropes.



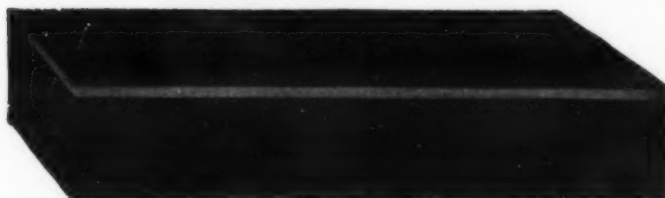
Sponge Rubber Joint—compressed to 50% thickness—the extrusion .50—recovery one hour 90-95% Felt or Mastic sides.

Servicised EXPANSION JOINTS

Cork Rubber Joint



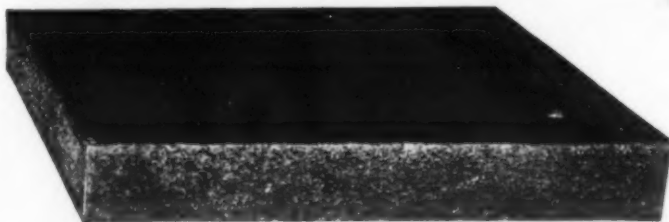
Cork Rubber Joint—compressed to 50% thickness—the extrusion .25—recovery 90-95%.



Felt Sided Asphalt Joint—compressed to 66% thickness—the extrusion .50—recovery one hour 68%—contains 70% Asphalt. Furnished with or without metal escapes or seals.



Cork Fiber Joint—compressed to 64% thickness—the extrusion .42—recovery one hour 71%—contains 38% Asphalt. Furnished with or without metal escapes or seals.



Fiber Joint—compressed to 50% thickness—the extrusion practically nil—recovery one hour 70-75%.



Type B Asphalt Joint—compressed to 66% thickness—the extrusion .42—recovery one hour 70%—contains 65% Asphalt. Furnished with or without metal escapes or seals.

THE above types of joint illustrate SERVICISED service to engineers and contractors in providing both the controlled oozing and non-oozing types of expansion joint. The specifications of the various types are shown under each type and are the minimum and not the maximum tests.

Our types of non-oozing joints will not warp or shrink in the hot sun or hot weather eliminating the necessity of wetting down before using.

The oozing types of joint are controlled by metal escape accessories making provision for the surplus flow under pressure. We also furnish engineers extruded joints for the reception of metal fittings and specialize on extruded products for engineers in State, Municipal, Railroad and Civil work.

SERVICISED service and performance have never been questioned and the same quality is being maintained as heretofore.

SERVICISED PRODUCTS CORP. • 6051 W. 65th ST. • CHICAGO



Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

New Economy in Spreading and Finishing

560 Catalog No. 1523 which may be secured from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., describes the Blaw-Knox road finish-spreader which will spread and finish stone or gravel, hot or cold asphalt mixes 1 to 15 feet wide.

A New Three-Axle Road Roller

561 The triple action of the new Buffalo-Springfield three-axle road roller means multiple compaction of bituminous and other surfacing materials, either hot or cold, at all times. The Buffalo-Springfield Roller Co., Springfield, Ohio, will be glad to send a copy of its new illustrated pamphlet describing this money-saving piece of equipment.

Looking Into An Arc Welder Factory

562 A 40-page book has been issued by Hobart Bros. Co., Box CE-16, Troy, Ohio, giving the prospective purchaser of Hobart Simplified arc welders a remarkable insight into the modern daylight-saving factory of Hobart Bros. where these machines are manufactured.

Economy in Bulldozer Operation

563 Baker direct-lift, twin-cylinder bulldozers which give economy of operation and accurate performance, and are simply constructed with no fast wearing parts, are described in Baker Bulletins which may be secured from The Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill.

An Effective "Three-Bagger"

564 Bulletin No. 127 issued by the Ransome Concrete Machinery Co., Dunellen, N.J., describes "the mixer with a background," the Ransome 14-S standard building mixer which contractors are using effectively on jobs requiring mixers of this capacity. The power loader rises in 7 seconds.

Dirt Moving Equipment at Work

565 A 12-page pictorial bulletin issued by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., shows LeTourneau dirt-moving equipment on the job and working in rock, mud, snow and sand the world over. A copy of this Bulletin G-1002 is yours for the asking.

Service Record of 2-Stage Compressors

566 The three-year service record of I-R 2-stage, air-cooled portable air compressors which pioneered the field shows that they have lived up to the claims that they would deliver more air, use less fuel and give more dependable service. The latest catalog on these compressors may be secured from Ingersoll-Rand, 11 Broadway, New York City.

A Catalog on Electric Concrete Vibrators

567 Syntron Co., 401 Lexington Ave., Pittsburgh, Pa., manufacturer of electric hammers, electric saws and electric concrete vibrators, will be pleased to send its latest catalog on any or all of these labor-saving devices on request.

Sweeper for Road Maintenance

568 The Reliance three-wheel rubber-tired street sweeper for use in the preparation of roads for low-cost surface treatment and in the maintenance of roads, is described in literature which the Universal Road Machinery Co., Kingston, N. Y., will be glad to send on request.

Material Handling Equipment

569 General Catalog No. 35 recently issued by Diamond Iron Works, Inc., Minneapolis, Minn., manufacturer of power transmitting and material handling equipment for quarries and sand and gravel plants, includes special listings of: belt conveyors; bucket elevators; car pullers; jaw and roll crushers; aggregate plants; plate feeders; vibrating, shaker and revolving screens; portable manhoists and hand winches; bin gates and spiral steel conveyors. Copies of this 315-page catalog may be secured by plant managers and contractors writing on their business letterheads.

Tower-Type Portable Asphalt Plants

570 Bulletin T-248 issued by Hetherington & Berner, Inc., Indianapolis, Ind., describes H & B tower-type portable asphalt plants which have large capacities for hot or cold mix with accurate control of material to comply with any standard specifications for bituminous mixtures.

Don't Let Cold Weather Spoil Your Job

571 Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, is prepared to help you out on any cold weather difficulties. There is Littleford heating equipment for concrete mixers, water supply for concrete, surface heaters, tool heaters, heating torches and salamanders. You may secure bulletins on any or all for the asking.

Road Rollers Designed to Speed Work

572 The latest catalog of The Huber Mfg. Co., Marion, Ohio, describes 5, 6, 7, and 8-ton Huber road rollers in detail featuring 6-cylinder power, four speeds in both directions, simplified control, replaceable roll rims, hand and power steering, hydraulic scarifier, short wheelbase, roller bearings throughout and its rigid frame.

Vibrating Screens and Conveyors

573 Materials handling, electric vibrating equipment of the Jeffrey-Traylor type is featured in a new 64-page Catalog No. 610 issued by the Jeffrey Mfg. Co., Columbus, Ohio. The catalog describes this equipment which has no mechanical wearing parts, gives specifications, and deals extensively with typical installations covering feeding, screening, conveying, drying and other handling operations.

With Byrd at Little America

574 Vol. 3 No. 22 of Cletrac Facts contains a very interesting article entitled "Following the Trail with Cletrac" describing the part that Cletrac played in Little America, operating in temperatures as low as 65 degrees below zero. Copies of this issue of Cletrac Facts may be secured by those interested from the Cleveland Tractor Co., Cleveland, Ohio.

Welding in Construction Work

575 This is the title of a new 8-page folder describing and illustrating the many uses of arc-welding in various types of construction. Copies of this folder may be secured by interested contractors from the Lincoln Electric Co., Cleveland, Ohio.

Tents, Tarpaulins and Windbreaks

576 Samples and prices of tents, tarpaulins and windbreaks sold under the trade names Shuredry and Fultex may be secured from Fulton Bag & Cotton Mills, Atlanta, Ga.

Heavy-Duty Dirt Moving Units

577 Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill., has issued a series of bulletins, which it is mailing in bound form, on heavy-duty track wheels and 6, 7, 8, 9, 11 and 13-yard heavy-duty crawler wagons and hydraulic bulldozers.

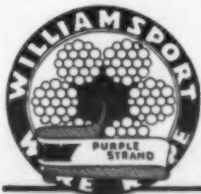
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Made with tough, fatigue-resisting wire, with the most minute accuracy, the most careful fabricating plus precision Preforming.

If you have already found that Preformed Wire Rope serves your installation better, then "Form-Set," Williamsport's method of preforming, will make you happier in its use.

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prices on _____

Proved Digging Power in Shovels

578 Northwest Engineering Co., 1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., in "Digging Power Plus" shows how you can check up on the greater digging power of a Northwest shovel before you buy. This booklet tells about the crowding mechanism and bigger engines that Northwest uses.

Air-Operated Concrete Vibrators

579 Munsell air-operated concrete vibrators for all classes of concrete construction including bridges, deck slabs, dams and locks, highway pavement and concrete products are described in the circulars of Munsell Concrete Vibrators, 997 West Side Ave., Jersey City, N. J.

Three Types of 7-S and 10-S Mixers

580 The three types of Smith 7-S and 10-S mixers, the conventional four-wheel side-discharge mixer, the new four-wheel end-discharge model and the two-wheel Trail-Smith, are described and illustrated in a new bulletin which the T. L. Smith Co., 2835 N. 32nd St., Milwaukee, Wis., will be glad to send on request.

New Spray Painting Catalog

581 A new revised 16-page loose-leaf catalog, describing the Thor line of spray guns, complete spray finishing systems, painting equipment and accessories, has recently been announced by the Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill., who will be glad to send a copy on request.

Pneumatic Tires for Wheelbarrows

582 A new 4-page booklet "Pneumatic Tires for Wheelbarrows and Industrial Trucks," giving specifications of the various tires, outlining their use in meeting various work problems and illustrating their application, has been issued by the B. F. Goodrich Co., Akron, Ohio. Copies may be secured direct from the company.

Road and Bridge Guard

583 The features of the Rex road and bridge guard rail for protecting the ever-speeding motorist at dangerous curves and turns on the highway and on bridges are described in literature which the Rex Road & Bridge Guard Co., Pittsburgh, Pa., will be glad to send on request.

Industrial Friction Materials

584 J-M industrial friction materials of both flexible and rigid styles, for brake linings and blocks and friction facings, are described in detail in a new brochure FM-4A which Johns-Manville, 22 E. 40th St., New York City, will be glad to send on request.

Diesel-Powered Road Rollers

585 The Davenport Besler Corp., Davenport, Iowa, has issued an 8-page bulletin on its 10 and 12-ton road rollers powered with Caterpillar diesel engines and equipped with nickel steel standard Caterpillar parts for gears, shafts, steering clutch and gear shift.

Data on Self-Priming Pumps

586 The latest free bulletin of Sterling Machinery Corp., 411-15 Southwest Blvd., Kansas City, Mo., not only describes Sterling 2 to 8-inch self-priming pumps which are used by contractors from coast to coast, but also contains useful engineering data.

High-Speed 6-Cylinder Diesels

587 Hercules Motors Corp., Canton, Ohio, has announced two new 6-cylinder high-speed diesels developing 79 and 82.5 hp at 2600 rpm. These series DJX compression ignition engines are described in literature which may be secured from Hercules.

DIESEL DRAGLINES

4 50-B Bucyrus Erie Diesel Draglines, 50-ft. boom, 10-ft. extension, Atlas engine, caterpillar mounting.

2775 P & H Diesel Draglines, 50 ft. boom, Atlas engine, caterpillar mountings.

The above are part of the surplus construction equipment of the Middle Rio Grande Conservancy District. Write or write for list of all equipment, which includes pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, trolley concrete placing outfit, concrete hoists and vibrators, gravel screening plant, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar benders and cutters, carbide floodlights, and other items at bargain prices.

R. L. HARRISON CO., INC.
ALBUQUERQUE, NEW MEXICO

ROCK DRILL BARGAINS

100 used CPIOW Chicago-Pneumatic Jackhammers in first-class working condition. Records of actual test alongside new drills show 75% efficiency. Exceptional values.

The J. C. McClintock Company
El Paso, Texas

A Fast-Trailing Fast Mixer

588 The Lansing 3½-T mixer on trailer mounting with wide tread rubber wheels and spring shock absorbers has a large mixing drum and trails fast behind a truck. A complete description will be found in the catalog of the Lansing Co., Lansing, Mich.

Fast-Loading Heavy-Duty Trailers

589 A low-platform machinery trailer made in 10-ton, 4-wheel sizes to 45-ton, 12-wheel sizes by Rogers Bros. Corp., 108 Orchard St., Albion, Pa., may help solve your equipment moving problems. Catalogs on request.

Fireproof, Oil-Burning Tar Kettles

590 White Mfg. Co., Elkhart, Ind., will be pleased to quote on its full line of hand and motor-driven spray, fireproof oil-burning tar kettles which are available in many sizes for all types of construction.

Buckets That Don't Take Time Out

591 A Hayward orange-peel or clamshell bucket keeps the job going ahead on schedule and doesn't quit or cause time out. Reasons? Questions? Send for the catalog of The Hayward Co., 32-36 Dey Street, New York City.

Steel Bridge Flooring

592 I-Beam-Lok bridge flooring which has completed its first year in service and has received the standard of approval of engi-

neers and contractors because of its light weight, ease of handling and long life is completely described in literature which may be secured from the Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

PORTABLE ASPHALT PLANTS TOWER TYPE

LARGE CAPACITIES HOT OR COLD MIX

Accurate control of materials to comply with any standard specifications for bituminous mixtures.

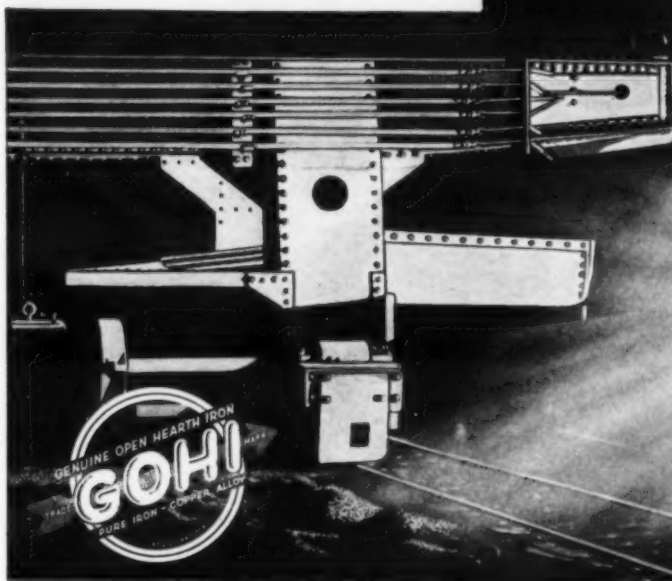
Send for Bulletin T-248

HETHERINGTON AND BERNER INC

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SINCE the introduction of GOHI Pure Iron-Copper Alloy no basic change has been made in the original analysis. Because the wear, weather and corrosion-resisting qualities of pure iron are appreciably improved by including a percentage of copper—this copper is deliberately added to the heat in the open hearth furnace.

That the judgment of our metallurgists is sound; that the basic GOHI Pure Iron-Copper Alloy analysis is right, finds overwhelming and conclusive proof in the

number of GOHI Corrugated Pipe installations that have been in the ground over a quarter of a century, successfully meeting the most destructive action of the elements.

The typical GOHI Pure Iron-Copper Alloy analysis* bears careful consideration. The presence of copper gives to GOHI Corrugated Pipe the extra value that translates itself into extra years of service and freedom from costly repairs and upkeep. Ask any fabricator for complete details.

*Mailed on request.

Meets copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.

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New England Bolt Co. Everett, Mass.
Central Culvert Co. Ottumwa, Iowa
Capital City Culvert Co. Madison, Wis.
F. Yeager Bridge & Culvert Works Port Huron, Mich.
Bancroft & Martin Rolling Mills Co. S. Portland, Maine
Denver Steel & Iron Works Co. Denver, Colo.
The Lane Pipe Corporation Bath, N. Y.
Dixie Culvert Mfg. Co. Little Rock, Ark.
St. Paul Corrugating Co. St. Paul, Minn.

Contractors and Engineers Monthly



Photo, Courtesy of Mexican Consulate, New York

A Scene on Mexico's 765-Mile Section of the Inter-American Highway Between Nuevo Laredo and Mexico City, Showing the Scenic Wonderland Opened Up to Tourists by the Work of Engineers and Road Builders. See Page 6.



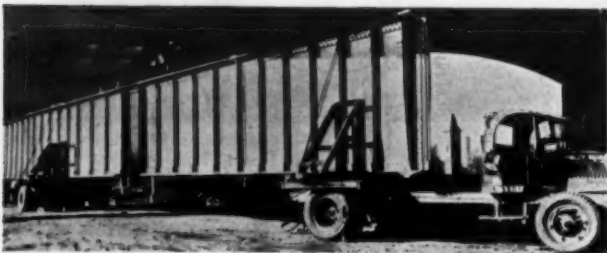
Part of the Blue Earth County, Minn., Snow Fighting Equipment on the Job to Keep the 475 Miles of County and State Aid Roads for Which the County Is Responsible Open to Traffic During the Winter Months. See Page 1.



A Moonlight View of the New 1,718-Foot High-Level Bridge over the Illinois River at Henry, Ill. This 12-Minute Exposure Was Taken at 10 o'clock at Night on the First Night the Structure Was Lighted. The Photograph Reproduced at the Right Shows the Same Structure Nearing Completion but Before the Concrete Floor Was Poured. See Page 2.



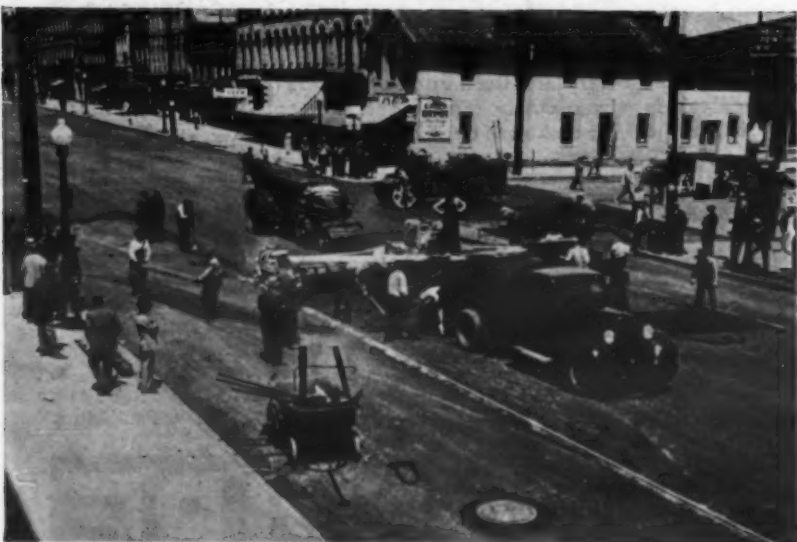
A Wide Curve on the Broussard-Warfield Co. Contract on PWC 4812 in Brazoria County, Texas. Note the Heavy Brackets for Holding the Expansion Joint Header in the Foreground. See Page 2.



One of the 65-Ton Girders Which Were Transported by Mack Trucks and Trailers to the Site of the Tri-Borough Bridge, New York City. This Is Said to Be the Largest Load Ever Carried on Pneumatic Tires. Each Pair of Vulcan Wheels and Kelly-Springfield Tires Is Supporting About 14 Tons, an Overload of 269 Per Cent.



A Truck and Trailer Batch-Box Hauling Unit Loading at the Bins on the Concrete Paving Contract of Lewis & Frisinger 10 Miles West of Ann Arbor, Mich. See Page 35.



C. & E. M. Photo

Hauling Hot-Mix 24 Miles, a 30-Foot Finishing Machine, and the First Appearance of a 3-Axle Roller Featured the Resurfacing of a 2-Mile Section of 34 to 60-Foot Street in Delaware, Ohio, by B. F. Patterson of Columbus, Ohio.



C. & E. M. Photo

A Fleet of Nineteen Trucks Hauled the Batches and Delivered Them to Four Heavy Sheet Iron Dumping Boards, Two of Which Were in Front of the Finishing Machine and One on Either Side. See Page 1.